40 Rocc Ro (5)

# POPULAR Computing WEEKLY

THIS WEEK'S SOFTWARE SEE PAGE 78

35p 24-30 November 1983 Vol 2 No 47

## This Week

**Sord M5**

The Japanese contender in the ferocious under-£200 computer market — Andy Pennell sees how it measures up See page 46

**Spectrum interrupts**

Alan Went shows how simple it is to use Z80 interrupts to improve your own programs See page 20

**Casio keyboards**

These electronic keyboards are flooding the shops — Graham Taylor wonders whether they are computers in disguise See page 13

**New releases**

All the latest software programs including *Four Gates to Freedom* by Phoenix and *Pub Crawl* from B & H Software See page 76

**STAR GAME**

Amoeba's Playtime on 48K Spectrum. See page 10.

## News Desk

### Acorn contract shoot-out

SINCLAIR Research has announced its intention to challenge Acorn for the BBC computer contract when it comes up for renewal next summer

"We would be most interested in competing for that contract if it is feasible for us to do so," said a Sinclair spokesman

As a first step Sinclair has written to the BBC to discover if the contract is to be offered on open tender "We want to state our interest openly, well in advance and find out how the BBC wants to handle it

"So far they have acknowledged our letter and confirmed that they are looking into it" added the Sinclair spokesman

Acorn remains unruffled by the Sinclair action Acorn is not at all worried — there is no reason why it should be — Sinclair tendered for the original contract and lost" explained an Acorn spokesman.

"We would be surprised if

Continued on page 5

# Ted revealed at Las Vegas

COMMODORE is expected to show a prototype of its new computer, the Commodore 444, for the first time at the Consumer Electronics Show in Las Vegas in January

The machine will be the first to use Commodore's new TED chip. The TED is a multi-purpose device, designed to reduce the number of components on the circuit board and thereby reduce manufacturing costs The TED combines the functions of system controller, video controller display processor and voice generator all in one chip The Commodore 444 will also be the first Commodore machine to use a new updated 6500-family central processor with optimised access to external memory

The Commodore 444 will be a more advanced machine than the existing Commodore 64 computer with sophisticated cursor control and built-in word processing

Commodore is also considering a new low-cost machine Commodore (UK)

Continued on page 5





Continued on page 59

**BRITAIN'S BEST-SELLING MICRO WEEKLY**

# MR CHIP SOFTWARE

## SPECTRUM GAMES

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Five games of darts for 1-5 players, 501, Cricket, Killer, Round the board, Noughts and Crosses, four levels of play per game, take on the computer or friends at these games of skill and judgement **£5.50**

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As for the Commodore 64, but now available for the 48K Spectrum, Texas T.I. 99/4A and Dragon **£5.50**

## VIC 20 GAMES AND UTILITIES

**JACKPOT**

This is it, the ultimate Fruit Machine for the VIC with nudge, hold and respin 100% machine code 'Overall Jackpot is a beautifully written simulation giving superb graphics, animation and use of colour. In fact, this program makes Commodore's Fruit Machine cartridge look unbelievably cheap and nasty" Home Computing Weekly No 20 19/7/83 **£5.50**

**KWAZY KWAKS**

Accuracy and speed are required for this Shooting Gallery, superb use of colour and graphics in this new and challenging game from the author of **Jackpot** 100% machine code joystick or keyboard control **£5.50**

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Choose your own game from the following options — difficulty 1-2, speed 1-3, size of maze 1-3, visible or invisible maze, still or moving power pills, define your own key controls, any combination, if this is your type of game, then this is the one for you, for the 3K expand VIC only **£5.50**

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## COMMODORE 64 GAMES AND UTILITIES

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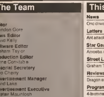






SUNSHINE

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## This Week



## Editorial

Acorn's contract to produce the BBC micro comes up for renewal next year.

Although there is little likelihood of the BBC taking the contract away from Acorn — despite initial production problems, the BBC micro has lived up to most expectations — other micro manufacturers, notably Sinclair, Dragon, Oric and Camputers, are itching to tender for the contract. Sinclair in particular, is eager to prove that the BBC made the wrong decision in selecting Acorn for the original contract.

Whatever the outcome of the BBC contract, there is also the intriguing possibility of a rival micro being launched by the independent television companies. The ITV networks are all too well aware of the lucrative spin-offs which the BBC has derived from its association with micros. It would be a natural move, though there is a lot of leeway to be made up, for the ITV companies to launch their own computer.

The ITV micro is not a new idea — Commodore has already had informal talks with at least one commercial station on the feasibility of producing just such a machine. However, any ITV micro would face problems unbeknownst to its BBC sibling.

For an ITV micro to have any hope of success, it would need to be embraced by all the independent tv companies, not just a proportion of them. This, in turn, would necessitate all the companies agreeing to common specifications for the micro.

## Next Thursday

**Can you find the hidden treasure in Diver — next week's Star Game for the Spectrum by John Durst.**

# Rival Oric disc drive from ITL

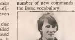
ITL, in Chatham, hopes to do for Oric what Premier Microsystems did for Dragon

This week the company will launch a rival disc drive system to Oric's own before the official Oric product has even appeared

Like the Oric Products disc unit, the ITL system — called the Byte Drive 500 — is based on the Hitachi 3 inch drive It is a 40-track single unit giving a formatted memory capacity of about 440K A double-sided 80-track version is also on the way

The Byte Drive 500 comes with its own power supply, capable of handling up to two disc units The interface to connect the system to the Oric 1 computer takes the form of a custom chip that has been built into the connecting cable linking the disc drive and computer

ITL's own disc operating system is supplied on disc and works as an extension to the existing Oric Basic Connecting the drive simply adds a number of new commands to the Basic vocabulary



Peter Halford

The system has been designed for ITL by Tyrell Computer Systems The design work of the ULA custom chip and DOS has been undertaken for Tyrell by Peter Halford, one of the original team of four which designed the Oric 1 He left Oric earlier this year

The ULA for the disc system is being manufactured for ITL by California Devices the Company which manufactures the ULA in the Oric 1

The Byte Drive 500 plus power lead, is priced at £167 28 The power supply unit is £25 93 and the connecting cable interface and operating system disc are £86 45

ITL is currently looking for high-street distribution for the Byte Drive 500

The first systems should go on sale by mail-order in early December More details from ITL, The Old Courthouse, New Road, Chatham Kent

● The first batch of Oric's own 3 inch disc drives originally planned for delivery in the summer, are not expected until mid-December Bulk deliveries are not scheduled until 1984

## Keyboard for 64

A NEW company Silynn, has announced a full size music keyboard for the Commodore 64 which will be priced under £150

Called the Microsound 64, it is a four-octave keyboard which simply plugs into the cartridge port on the Commodore 64 Software, initially available only on disc then converts keys depressed on the Microsound 64 into musical notes played through the tv loudspeaker

The device also features two slider controls which operate a simple music synthesiser Using these it is possible to alter not just the pitch of a note, but also its character

Notes played on the unit can be stored in the memory of the computer, or saved out either to tape or disc, and recalled

The software which accompanies the *Microsound 64* — on disc — is the first of a series of programs to be produced by Silynn Future packages will allow more complex musical effects, such as a sequencer using the different voices of the 64 and a hardware/software combination capable of digital sampling

The Silynn Microsound 64 will be available in mid-December, priced at £125 Details from Autographics 3a Reading Road, Henley-on-Thames

## Magic Desk delayed

COMMODORE'S *Magic Desk* software for the Commodore 64 computer has been delayed again The first package is not expected to go on sale in the UK until early next year

When Apple first announced its Lisa machine in January this year complete with 'mouse graphics Commodore was one of the first companies to announce software packages offering similar facilities

Commodore announced *Magic Desk* a series of 32K Rom software cartridges for the Commodore 64

*Magic Desk* provides on-screen, a pictorial representation of an office Using a joystick a screen cursor can be directed around the picture By pointing at different parts of the office display and pressing the joystick fire button, different options can be selected pointing to the filing cabinet gives file handling, pointing to the typewriter gives word processing

The first *Magic Desk* cartridge, *Magic Desk 1 – Type and File* has recently gone on sale in the US priced under $100 It contains the word-processing and information filing software

However *Magic Desk 1* has not been greeted very enthusiastically by Commodore UK

"We will probably go ahead with *Magic Desk 2* rather than *Magic Desk 1* — it's a better program," explained Commodore UK's marketing manager John Baxter

*Magic Desk 2* is similar to *Magic Desk 1* except it offers additional calculator and home budget software facilities *Magic Desk 2* is unlikely to appear in the UK until early in 1984

## Ted

Continued from page 1

would like to see a Spectrum-basher manufactured at Corby which would be a cut down version of the 64 without sprite graphics and advanced sound handling

## Acorn shoot-out

Continued from page 1

Sinclair had a product that would match up to the Acorn BBC machine

"From Acorn's point of view the renewal is a formality — simply because of the relationship we have with the BBC If there were going to be any problems we would know by now anyway "

● Since Acorn was awarded the BBC contract in April, 1981 its turnover has increased more than 30-fold In the year ended June 1981 turnover amounted to £1 36m considerably less than the £42 355m recorded in the year ended June 1983

## Software incompatibility

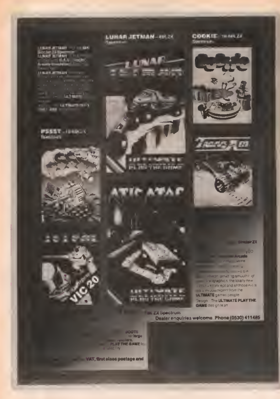
*ALTHOUGH IBM claims that the majority of programs available for the PC will run directly on its new low-cost PCjr, only a small proportion will run directly on the entry model ($669) version of the machine*

*Most of the programs for the PCjr require the more advanced operating system offered by the 2 1 disc operating system of the expanded model ($1 269)*

*Of the programs that will run on the entry model a proportion will only work in conjunction with a Basic extension cartridge which itself costs $75 The so-called Cassette Basic in Rom on the entry model is not sufficient*

*IBM itself suggests that the enhanced discette version of the PCjr will prove the more popular option A configuration including the expanded model tv connector, DOS 2 1 and cartridge Basic will cost over $1,400 Of the five new software programs announced by IBM specifically for the PCjr, only one will work directly on the entry model and two of the others require the Basic cartridge to work on the expanded model*

*The PCjr is only on sale at present in the US and Canada No European launch date is yet available*



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## Antescher rescue

Just a note to put in my claim for the title of First person to rescue all 10 victims from Antescher

I bought *3D Ant Attack* on 12 November and had completed it by 13 November. Rescuing each victim becomes harder as the game progresses, and as you are up against time as well as the guardian ants each life saved is a great relief as well as a step nearer to your goal

My score on completion was 33,106, as well as the gold medal I was presented with at the end of the game. I now throw out the challenge for someone to rescue the 10 prisoners in Antescher in a shorter time than it took me and with a higher score.

I hope Sandy White produces more software of this quality and originality

Well must go now as Ant Attack has just finished loading

*D Claypole*
*6 Helpston Road*
*Glinton*
*Peterborough PE6 7JT*

## Strategy column

I read your magazine regularly and find it quite entertaining. I have therefore noted with interest the idea of an arcade corner

I would like to propose something different. A strategy/simulation column. I realise many disillusioned Neanderthal alien zappers turn to quests and gold for their entertainment — hence the success of Tony Bridge's page — but another medium from brain to computer is the 'you are in control' idea, ie, strategy/simulation

The format of such a column would be much the same as Tony's corner — a review, comments and miscellaneous items. Although a subdivision of mind game software houses do cater for us not-so-rare breed — DK'Tronics, Lothlorien, Psion, Severn, CCS and Hewson, to name but a few. Please think about it

*D Mitchell*
*36 The Moorlands*
*Hanley Road*
*Malvern Wells*
*Worcestershire WR14 4PS*

PS Is New Releases a review or not? If not, then kindly refrain from making criticisms

**As with adventure games, there seems to be a growing interest in strategy and simulation games of all types. Flight simulation programs are particularly popular at the moment.**

**We would be very interested to hear the views of other strategist/simulators towards such a column.**

**As for New Releases, it is not intended as a review so much as a round-up of some of the software produced each week (the remainder you can find in our This Week column). But if a program has a feature which is particularly praise/blameworthy, obviously we will mention it**

## Commodore roasting

Can you explain why reviewers such as Andy Pennell need to abuse their position by making snide remarks about other computers whilst reviewing? I don't think that his remarks about the Commodore machines were complementary to a review on the Memotech micro

So the Commodore needs add-ons, so do a lot of micros. You need about £60+ spent on the hallowed Spectrum to bring it anywhere near the Vic for keyboard and sound. Leave off, Mr P — the beloved ZX81 had to go through a roasting, now it looks as though it's the turn of Commodore.

One fed-up ZX81 and Vic owner

*I Boulton*
*7 Courtney Way*
*Kingswood*
*Bristol*
*BS15 2RX*

## Ego booster

I would like to reply to Craig Mitchell's 'Waste of space' letter (*PCW* 10-16 November)

My first point is that he himself wasted space by trying to boost his ego with his amazing high scores. 'Hey man I've survived 5.3 centillion waves and saved the world's population after consuming a cruise missile while playing Warfare.'

Point two is that it's *Tranz am* — note the weird shape after the *n*

My last point is that if he understood what *Vetpec* and *Trantam* were, why did he bother to complain? If he understood, then everybody will be able to work it out

PS Please keep a few mistaks in the clasifide pages and perhaps put sum in on purpos. Well done, Diane

*Lance Rock*
*(address withheld by request)*

## Fascinating patterns

Re Pete Gerrard's item on CBM 64 (Vol 2, No 44, page 35). Herewith a small alteration producing fascinating patterns

Muck about with *Z* increments (line 70) and *FNA* (line 14) for further fun. You've got to wait and wait.

*N Leigh*
*7 The Handbridge*
*Fulwood*
*Preston PR2 4LE*

```
5 POKE53272,PEEK(53272)OR8
7 POKE53265,PEEK(53265)OR32
10 FORI=8192TO8192+7999 POKEI,0 NEXT
12 FORI=1024TO2023 POKEI,1 NEXT
13 Z=0.1
14 DEFFNA(X)=COS(X/Z)
15 FORX=0TO319
20 Y=INT(100+100*FNA(X/10))
25 C=INT(X/8) R=INT(Y/8) L=YAND7
30 BYTE=8192+R*320+8*C+L
40 B=7-(XAND7)
50 POKEBYTE,PEEK(BYTE)OR(2↑B)
55 IFY=<2THEN70
60 NEXT
70 Z=Z+0.3 GOTO15
```

## Competitive urge

Arcade games are certainly the most popular use of home computers, but is it really necessary to fill the valuable space of your letters page with claims of highest scores?

These claims seem particularly futile when you have also published letters describing bugs in some of the games which enable high scores to be achieved easily

Recently there was a letter describing the bug in *Jetpac* where, by standing on the middle platform on the fourth screen the Jetman can, given time, achieve infinitely high scores without being shot. This week (10-16 November) you published a letter describing a *Jetpac* score of over a million which can be achieved by anyone capable of reaching the fourth screen.

The printer dump or photograph method of validating high scores is easily forged. I enclose a photograph (of poor quality) showing a high score of 999760 on *Jetpac*. In fact I simply wrote a program to produce the screen display (about 10 minutes work) and could have inserted any value for the high score

Perhaps the arcade fans could organise some events where the competitive urge could be satisfied. Hire a hall, set up a couple of Spectrums, load them with a popular program and let the alien zappers fight it out live. By charging an entry fee, the organisers could probably make a reasonable profit. This would leave the letters page free for some more thoughtful letters

*Simon Cross*
*Boland House*
*Guy's Hospital*
*London SE1 9RT*



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# Amoeba's Playtime

**A new game for 48K Spectrum by Terry Wiley**

Down at the Microscopic Zoo, Fang the Killer Amoeba is happily squishing around the deserted Bacteria Compound. But playtime is over and it's time to put the bacteria back.

Fang is annoyed at this interruption, and will eat the bacteria if they are left unprotected, so you must attempt to enclose bits of the compound with amoeba-proof fences where the bacteria can be safely re-introduced.

The fence-layer (a little blue block at the bottom of the screen) can be moved around the edges of existing fences with the cursor keys 5 to 8, and can draw new fences by also pressing CAPS SHIFT. However, be warned that uncompleted (red) fences are vulnerable to Fang, and if he hits one you become his next meal and the game will end.

To safely complete a fence, join it to the compound wall or to another completed region, and the empty pen will fill with bacteria. One point is obtained for every bacterium introduced, and if you manage to introduce more than 6,000 bacteria, Fang will give up and go back to his cage. Each bacterium above this threshold scores 2 points; note that you need 100 extra bacteria each screen to subdue Fang.

To enter the program, do the following:

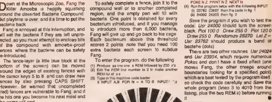
(1) Produce as line one a REM followed by 230 x's
(2) Edit the REM line number to 2 to make another REM-ful of x's
(3) Type in this machine code loader

```
5 INPUT A,B: FOR N = A TO B: INPUT "";Z: POKE N,Z: PRINT N;" ";Z: NEXT N
```

(4) Run the program twice with the following INPUT
 (i) 23762 23887 then the code in fig 1
 (ii) 24000 24203 then fig 2

*Save* the program if you wish to test the code. *Usr 24000* should turn the screen black. *Plot 100,0: Draw 255,0: Plot 120,0: Draw 255,0: Randomize 28270: Let Z = Usr 23762* should produce a band of bacteria (dots).

There are two other routines, *Usr 24024* and *Usr 23954*, which require numerous *Pokes* and don't have a fixed effect (one moves Fang, the other creeps around boundaries looking for a specified point) which are best tested by the program itself, so check the code carefully and *Save* the whole program (lines 3 to 4010 from the listing, plus the two REMs) before running it. ■



```
3 GO TO 500
4 OVER 1: PLOT x-1,y-1: DRAW 2,0: DRAW 0,2: DRAW -2,0: DRAW 0,-2: OVER 0: RETURN
6 DATA 102,153,60,152,154,55,141,182
7 DATA 102,153,130,154,69,141,53,58
8 DATA 0,4,4,0,0,-4,-4,0
9 POKE 23675,88
10 RESTORE 6: FOR c=USR "a" TO USR "c"-1: READ a: POKE c,a: NEXT c
11 LET sc=0: LET thr=5000
12 DIM x(4): DIM y(4): FOR c=1 TO 4: READ x(c),y(c): NEXT c
14 LET k=0: LET w=0: LET a=50: POKE 24007,5
15 BORDER 0: INK 5: PAPER 0: CLS
18 POKE 23780,0: POKE 23781,0
20 GO SUB 1000
40 LET a=USR 24064
42 IF a<>255 THEN GO TO 4000
50 GO TO 100+CODE INKEY$
107 FOR a=1 TO 22: NEXT a: GO TO 600
108 LET d=4: LET r=1: LET l=2: GO TO 540
109 LET d=2: LET r=3: LET l=1: GO TO 540
110 LET d=3: LET r=4: LET l=2: GO TO 540
111 LET d=1: LET r=2: LET l=4: GO TO 540
152 GO TO 107
150 LET xr=2: LET xl=-2: LET yr=-2: LET yl=2: GO TO 570
154 LET xr=-2: LET xl=2: LET yr=-2: LET yl=-2: GO TO 570
156 LET xr=2: LET xl=-2: LET yr=2: LET yl=2: GO TO 570
158 LET xr=2: LET xl=2: LET yr=-2: LET yl=-2: GO TO 570
555 GO TO 107
540 IF POINT (x+x(d),y+y(d))=0 THEN GO SUB 4: PLOT x,y: LET x=x+x(d): LET y=y+y(d): DRAW x-PEEK 23677,y-PEEK 23678: GO SUB 4: INK 5: GO TO 600
541 IF POINT (x+.5*x(d),y+.5*y(d)) THEN GO TO 600
542 LET xx=x+x(d)+.5*x(d): LET yy=y+y(d)+.5*y(d)
543 IF POINT (xx+.5*x(r),yy+.5*y(r)) OR POINT (xx+.5*x(l),yy+.5*y(l)) THEN INK 2: GO SUB 4: PLOT x,y: LET x=x+x(d): LET y=y+y(d): DRAW x-PEEK 23677,y-PEEK 23678: INK 5: GO SUB 2000: GO SUB 4
545 GO TO 500
570 GO SUB 4: IF POINT (x+xl,y+yl)<>POINT (x+xr,y+yr) THEN LET x=x+xl+xr: LET y=y+yl+yr
571 GO SUB 4
600 LET k=NOT k: POKE 23675,9+k*8
700 GO TO 40
```

| | | | | | |
|---|---|---|---|---|---|
| 23760 | 0 | 0 | 237 | 75 | 118 |
| 23765 | [illegible] | 197 | 225 | 286 | 34 |
| 23770 | 205 | 40 | 35 | 193 | 254 |
| 23775 | 1 | 200 | 197 | 205 | 172 |
| [illegible] | [illegible] | 205 | 229 | 34 | 133 |
| [illegible] | [illegible] | 0 | 5 | 205 | 214 |
| 23790 | [illegible] | 42 | 187 | 4 | 1 |
| 23795 | 205 | 214 | 9 | 193 | 13 |
| 23800 | 13 | 16 | 208 | 214 | 92 |
| 23805 | 193 | 16 | 12 | 12 | 209 |
| 23810 | 214 | 92 | 193 | 201 | 145 |
| 23815 | 169 | 172 | 7 | 148 | 109 |
| 23820 | 0 | 1 | 0 | 255 | 0 |
| 23825 | 0 | 0 | 17 | 0 | 0 |
| 23830 | 0 | 208 | 130 | 93 | 0 |
| 23835 | 40 | 12 | [illegible] | 123 | 254 |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |

Fig 1

```
1000 FOR c=1 TO 8: PLOT c,c: DRAW 255-2*c,0: DRAW 0,175-2*c: DRAW 2*c-255,0: DRAW 0,2*c-175: NEXT c
1060 PLOT 98,175: DRAW 0,-12: DRAW 54,0: DRAW 0,12
1070 PRINT AT 1,13; INK 7;w
1100 LET qx=INT (RND*28+1): LET qy=INT (RND*18+1)
1101 IF SCREEN$ (qy,qx)<>" " THEN GO TO 1100
1105 LET qdx=1-2*(RND>.5)
1110 LET qdy=1-2*(RND>.5)
1112 POKE 24016,qy: POKE 24017,qx
1113 POKE 24018,qdy: POKE 24019,qdx
1120 LET x=128: LET y=8: GO SUB 4
1130 RETURN
2000 POKE 23616,x-SGN x(d)+SGN x(r)
2001 POKE 23617,y-SGN y(d)+SGN y(r)
2002 LET m=PEEK 24017*8+4: FOR n=175-8*PEEK 24016 TO 170 STEP 4: IF POINT (m,n) THEN GO TO 2004
2003 NEXT n: STOP
2004 POKE 23614,m: POKE 23615,n-1: LET z=USR 23954
2005 IF z=0 THEN RANDOMIZE x-.5*x(d)+.5*x(r)+256*(y-.5*y(d)+.5*y(r)): GO SUB 2050: RETURN
2006 IF z=1 THEN RANDOMIZE x-.5*x(d)+.5*x(l)+256*(y-.5*y(d)+.5*y(l)): GO SUB 2050: RETURN
2008 IF z=2 THEN PRINT "error": STOP
2050 POKE 23695,5: LET o=USR 23752
2051 LET o=USR 24000
2052 LET w=PEEK 23780+256*PEEK 23781
2053 PRINT AT 1,13; INK 7;w
2054 IF w>thr THEN GO TO 3000
2055 RETURN
3000 FOR n=0 TO 64: POKE 24007,n: LET o=USR 24000: NEXT n
3010 CLS : PRINT AT 5,6; INK 7;"SCORE ";: FLASH 1;sc+w; FLASH 0;" POINTS"
3012 PRINT AT 7,5; INK 7;"BONUS ";: FLASH 1;w-thr; FLASH 0;" POINTS"
3016 PRINT AT 10,6; INK 7;"TOTAL ";: FLASH 1;sc+w*2-thr; FLASH 0;" POINTS"
3020 LET sc=sc+w*2-thr: LET thr=thr+100
3030 PRINT AT 14,0; INK 7;"THRESHOLD IS NOW";TAB 12; FLASH 1;thr; FLASH 0; TAB 18;"POINTS"
PAUSE 200: GO TO 15
4000 FOR n=0 TO 64: POKE 24007,n: LET o=USR 24000: NEXT n
4010 CLS : PRINT AT 10,7; INK 7;"SCORE ";: FLASH 1;sc+w; FLASH 0;" POINTS"
```

| | | | | | |
|---|---|---|---|---|---|
| 24000 | 1 | 0 | 3 | 33 | 0 |
| 24005 | 88 | 54 | 64 | 35 | 11 |
| 24010 | 120 | 177 | 32 | 248 | 201 |
| 24015 | 120 | 1 | 22 | 255 | 255 |
| 24020 | 120 | 120 | 120 | 120 | 23 |
| 24025 | 75 | 208 | 93 | 42 | 210 |
| 24030 | [illegible] | 122 | 122 | 71 | 121 |
| 24035 | 133 | 78 | 197 | 205 | 131 |
| 24040 | 37 | 205 | 28 | 35 | 193 |
| 24045 | 254 | 2 | 220 | 197 | 205 |
| 24050 | 120 | 94 | 87 | 193 | 197 |
| 24055 | 58 | 211 | 93 | 237 | 58 |
| 24060 | 128 | 71 | 213 | 205 | 125 |
| 24065 | 94 | 111 | 209 | 193 | 58 |
| 24070 | 210 | 93 | 237 | 58 | 129 |
| 24075 | 79 | 220 | 213 | 205 | 128 |
| 24080 | 94 | 209 | 225 | 193 | 123 |
| 24085 | 254 | 0 | 32 | 10 | 124 |
| 24090 | 165 | 40 | 6 | 205 | 120 |
| 24095 | 94 | 205 | 100 | 94 | 124 |
| 24100 | 254 | 0 | 204 | 100 | 94 |
| 24105 | 125 | 254 | 8 | 204 | 109 |
| 24110 | 94 | 42 | 200 | 93 | 34 |
| 24115 | 110 | 94 | 237 | 91 | 210 |
| 24120 | 92 | 124 | 130 | 163 | 125 |
| 24125 | 231 | 111 | 34 | 205 | 93 |
| 24130 | 34 | 125 | 84 | 237 | 95 |
| 24135 | 230 | 7 | 246 | 4 | 5 |
| 24140 | 0 | 0 | 0 | 0 | 58 |
| 24145 | 125 | 94 | 33 | 118 | 94 |
| 24150 | 5 | 10 | 126 | 197 | 229 |
| 24155 | 215 | 225 | 193 | 35 | 16 |
| 24160 | 247 | 14 | 205 | 201 | 58 |
| 24165 | 211 | 93 | 237 | 58 | 58 |
| 24170 | 211 | 93 | 201 | 58 | 210 |
| 24175 | 83 | 237 | 58 | 58 | 210 |
| 24180 | 93 | 201 | 22 | 18 | 23 |
| 24185 | 32 | 22 | 17 | 22 | 18 |
| 24190 | 0 | 144 | 205 | 58 | 37 |
| 24195 | 205 | 241 | 43 | 120 | 177 |
| 24200 | 40 | 1 | 28 | 201 | 120 |

Fig 2

# Budding superstars

***Graham Taylor** looks at the growing links between electronic keyboards and micros*

What costs between £40 and £500 has a memory is programmable and can be used with add-ons like light pens? It s a Casio keyboard

Just as microcomputers have moved out of the specialist shops and now flourish in toy stores book shops and supermarkets so electronic keyboards have moved out from the specialist music shops

A Casio electronic keyboard is a bit like an organ but is capable of very unorgan like sounds It s a bit like a synthesizer but is very easy to program In some respects it s even a bit like a computer

Casio Electronics is a Japanese company whose pre-tax profits rose by 13 4 percent to around £20m (Y7bn) in the half year ending in September Although Casio is involved in a number of electrical products all of which have grown in sales the really startling growth is found in their office computers and their electronic musical instruments — up by an enormous 50 per cent

Britain has taken the Casio keyboard to its heart, the basic model, the *VL-1*, has sold nearly half a million since its release in May 1981

Dave Caulfield is the National Sales Manager for Casiotone UK. Even he is surprised by their success "We ve tried to do an analysis of our market but it s really impossible to come to any specific conclusions — there seems to be almost no type of consumer who couldn t be a prospective purchaser

Britain has always been full of weekend musicians — people who play for their own amusement at the weekend — no musical instrument manufacturers could manage on the sales to the big name groups, but Casio has gone beyond that

As with computers the technology is getting relatively cheaper and much more widely available "With a four track cassette machine and a mid range Casio, you have about as much equipment in your home as the Beatles had for their early records" explained Dave

The instruments are inevitably the result of microchip technology The internal workings complete with sound and rhythm chips memory and input/output ports would be familiar territory to computer buffs

Just as computers have an international standard for connecting one to the other — RS232 — so the latest generation of electronic keyboards have a similar standard interface called MIDI, or musical instrument digital interface This enables one keyboard to be played from another set to different sound styles eg brass on one and strings on another "You could also slightly de-tune one of the keyboards to get a very full spacey sound" explained Dave

To complement the new Casio keyboards, the company will be selling interfaces for the best selling micros — this will almost certainly include Commodore, Acorn and Sinclair

Surprisingly perhaps Dave does not see the computer adding much to the quality and range of sounds available from the micro "If that were the only point of the interface, why bother? Even the *VL-1* has more sound facilities than most of the micros — certainly for practical musical purposes"

The real point of the computer link Dave sees as educational "As much as anything else we re trying to make it easy to learn music and it s important to give people visual references — it s something we ve tried to do using the LEDs that light up each note as it s played but obviously with a tv screen we could do much better

To this end Casio are starting to look at software houses as potential independant suppliers of educational material "I see us consulting with a software house in terms of technical information but it s the visual display that will be really important — there are so many different ways the two things could be tied together"

Whatever the future of the keyboard/micro linkup one thing seems clear from even a cursory glance at the latest machines — some fundamental computing concepts are being incorporated Perhaps the most interesting of these is the idea of Rom and Ram cartridges

Two machines, the *MT 800* and the *PT 50* include cartridge slots very much like those on computers



Rom cartridges contain groups of popular pieces of music which the Casio will play automatically Budding superstars and egomaniacs everywhere can even connect a microphone to the machine and mix in their voice to sing along with the music

The *PT 50* can also accept Ram cartridges which is perhaps the most important new development The Ram cartridges are used rather like a tape recorder with computers to store your own creations for retrieval at a later stage

The idea of Ram is likely to be extended further using it to store actual sound types for example "If you wanted, you could have no sounds built into the keyboards at all — just cartridges containing various sound building blocks whose parameters you can change using the instrument "

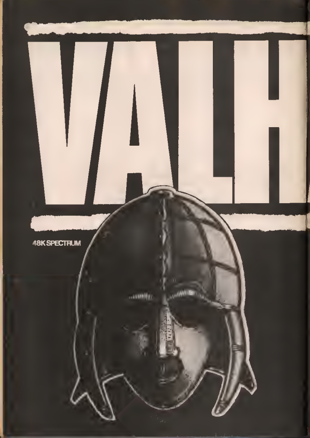
A similar idea is already found in some of the Casios including the *VL-1* using the ADSR function which stands for attack decay sustain release This gives the main features of the preset sounds a numerical code consisting of feet envelope and modulation These can then be mixed in any combination to give a wide range of sounds different to but derived from the presets

In principle this idea could be extended to give virtually limitless ranges of sounds The Casio *1000P* for example is capable of most things an expensive synthesizer can produce merely by manipulating 10 presets in exactly this way

Casio has plenty of competitors including Seiko and the mighty Yamaha, but Dave is confident "Casio won t produce anything unless we are sure there is a big market for it We ve been aware of the computer market for a long time, but basically we ve made a decision not to get involved either with the keyboards or by say issuing our own home computer

Next year will see the demise of many well-known computer companies predicts Dave "It s a good job we ve kept on the sidelines Look at the big names who are in trouble — the shakeout has already started

"By the middle of next year we'll have keyboards with interfaces built in and we ll cover the major micros by providing appropriate connectors But with the Casio keyboard I think we ve discovered a genuine consumer product — something that appeals to all sorts of people for all sorts of reasons I sometimes wonder if that s really true of home computers ■



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# The expanding Dragon

***Keith and Steven Brain** take a look at the range of enhancements now on the market for the Dragon*

No home micro is initially capable of everything the user might want to do with it and therefore it is usual for a range of enhancements to come on to the market from independent suppliers. The Dragon is well supported by the independents who offer a wide range of products on cassette, cartridge, and now disc.

These offer a wide range of facilities, but it is often difficult to compare their capabilities with the advertising claims. This review takes a look at many of the products now available and evaluates the potential benefits to the user.

One of the main criticisms of the Dragon centres on the text display. Many people feel that 32 columns is not enough and that true lower case characters are really essential. There are several ways of remedying this problem by generating high resolution characters within a Basic program, but several companies are now offering machine code programs providing text on the hi-res screen. Below are details of four of these which differ somewhat in their capabilities and price; two of these are "Hybrid" products offering high-res text and "tool kit" functions at the same time.

*Scribe* (Premier Software) is available on tape and the Delta disc system. It produces upper and lower case on a 42★24 display in *Pmode 4* only. The size matrix was apparently selected as the largest which can be guaranteed to be clearly legible on most domestic tv s and it

```
THIS IS SCRIBE IN UPPER CASE
Th s  s Scr be  n UPPER and lower case
PRINT CHR$ 1
2
Th s  s Scr be under l ned
PRINT CHR$ 1);CHR$ 2)
```

was certainly very clear on the three sets tried.

Automatic underlining and inverse characters are available using *Print chr$(n)* and the *Print @* command uses the 42★24 grid. Another extremely useful command is *Put @ X Y n* which allows you to place a character anywhere on the screen to within one screen point, allowing you to produce subscripts, superscripts and sprites. The *Print 1* command allows you to redefine characters but you have to calculate these as a series of binary numbers although this procedure is clearly explained and instructions are given for saving your redefined character set.

*Scribe* is compatible with the other Premier utilities and will often be used in conjunction with them. At £13.95 on cassette or £14.95 on disc, *Scribe* offers reasonable value for money if you only want to produce a relatively straightforward true text display.

*Rainbow Writer* (Microdeal) was originally written for the Tandy CoCo by Rainbow Connection Software and it is the only commercial software we have seen so far on a Dragon Disc, although apparently Microdeal plan to sell discs configured for the Premier/Cumana Delta system.

There are two versions of *Rainbow Writer* provided, which give 32/42 characters a line or 50/64 characters a line. In each case you can alter the distance between each character by specifying a low-density (32 or 50) or a high-density (42 or 64) mode. You can also enlarge characters up to a massive 16★8 which is good for titles and educational purposes.

The character sets can be redefined and if you want to save memory you can load in only a partial set. The program locates itself at the top of memory and it therefore does not interfere with many other enhancements. You can produce legible text in any *Pmode* as well as different size, width and colour characters, subscripts, superscripts, inverse video and underlining.

You can also produce artefacted colours in *Pmode 4*, protect parts of the screen from scrolling and mix the facilities on the screen at the same time. At any point you can call up a *Help* screen which tells you the current settings of the program. A demonstration program showing the advanced features of *Rainbow-Writer* and a good on-screen character generator are included.

John Symes says that the Dragon distributor in Greece is giving away a copy of *Rainbow-Writer* with the Greek character set with every machine! The only real winge is that the display commands must be called by Escape sequences, rather than new Basic commands, so that you have to type *Print CHR$(27)* ★★★ each time (where ★★★ is one of many commands). Of course you could predefine the command sequences you will be using frequently as strings.

This is the most flexible of the high-resolution text enhancements and even though the price is around £20 it is good value if you are going to use the versatile facilities. It is interesting to note that encouragement and a limited licence is given to the incorporation of the program into commercial software, rather than the usual dire (and ineffective!) threats.

*Edit+* (including *Hi-res*) (Compusense) is a cartridge so it uses very little of the Dragon memory, but of course it effectively blocks the expansion port so that you cannot add anything else. Two instruction booklets are included, one for *Hi res* and one for *Edit+*, and since *Hi res* is also sold separately we will consider the facilities of that first.

The program produces a 51★24 character display but only operates in *Pmode 4*, which becomes the default mode whenever you use *Print* or a prompt appears. There are four *Print* commands. *Print* uses the whole 51★24 matrix, but *Print @* uses a 32★16 window so that it is compatible with the normal Dragon display and you can test normal-mode programs. *Print 1* is similar to the standard *Print @* but works on the 51★24 matrix, and *Print %* prints 'sprites' which are specified by X and Y coordinates.

These sprites are actually characters which are put on the screen with exclusive OR logic, and the sprite mode is rather irritating to use as the prompts, cursor and *Print* command become distorted. Nine character sets are included (although many of the 'different' characters are the same) and characters can be redefined, although this must be done by calculating binary numbers and the definition must be saved as a separate program.

The *Cls* command is extended to provide a number of functions and control codes are also used to provide some extra features. Auto-repeat is included but there is a very long delay before it is activated.

The *Edit+* full screen editor and programmers tool kit is only activated when you type *Edit*. It displays the program on the 51★24 screen and has editing features of the type usually found on word processors. Reading programs formatted to 51 characters was rather difficult and the screen refresh was very slow so that it took a long time to work through a program.

The editing and 'tool kit' facilities were not very impressive especially when compared to the competition, and at £25 for *Hi-res* and £34 for *Hi res* with *Edit+*, rather over-priced. The cartridge approach is not the most logical way to provide these facilities.

*Picture Writer* (Rampage) is more than just a text on hi res screen program as it includes some useful extensions to Basic. It is supplied on a tape which auto-starts and it sits at the bottom of memory. The




DELTA SYSTEM
DRAGON 32 SOFTWARE
1983 PREMIER MICROSYSTEMS

display is only 32*16 but it has true upper and lower case, a full screen cursor commands to program the cursor through *Print* statements and it is a great improvement over the standard display

A major difference to the other text on high res programs is that you have separate control over text and graphics where these are mixed There are three types of screen clear *Pcls* or *Clsg* just clears any graphics on the screen and leaves the text *Clst* clears the text and leaves the graphics and *Cls* clears both

You can specify scroll protected areas or *Freeze* the screen completely and scroll the text over static graphics Characters can be redefined using either binary codes or a proper screen-based character generator which is activated by the *Char* command and *Csavec* saves character sets without the need to remember addresses and allows you to save only parts of the character set

If you type *Graf Off* you go back to the normal Dragon display but the additional Basic commands are still available Including the full screen cursor The keyboard is redefined so that the graphic characters can be accesaed directly from the keyboard and use abbreviated keyword entry You can set the keyodard back to normal with *Key Off* and auto-repeat and a bell are included which can be turned on and off by *Rep On Off* and *Bell On Off*

An *Old* command is provided which will normally resurrect a program which was accidentally *Newed* and you can switch between *Fast* and *Slow* mode

This program offers a useful extension to the facilities of the Dragon and at £10 it is excellent value for money

Although the Basic commands for handling sound in the Microsoft Extended Colour Basic used on the Dragon are very easy to use only one sound channel is available which is rather limiting, and the speech produced by *Computavoice* and programs like *Talking Android Attack* is pretty unintelligible

On the other hand *The Dragon Composer* program (Microdeal/Speech Systems) solves the music problem as it gives you four sound channels each one with up to seven octaves You enter tunes in a format which has some resemblance to the *Play* command but in *Data* statements which are placed at the end of part of the composer program For example

```
2610 DATA D5G4D4B4Q
```

means

```
Play note D in octave 5 in channel one
          G           4            two
          D           4            three
          B           4            four
(All the notes being quavers (Q))
```

Fifteen lengths from a whole note to a 1/32 note are allowed sharps and flats are available, and the tempo and key can be changed Comprehensive editing and saving facilities are included and when you have entered your tune you can compile it into a self-contained machine code subroutine with the *Complete Source* command

You can *Play* this *Music* directly, but an important feature of *Composer* is that you can also use this compiled routine to add first class sound to any other program Although the processor is totally dedicated to producing the sound you can put the command *Basic* into the Data to return control to Basic during a tune, so that you can arrange to interrupt it if necessary

This program completely transforms the sound output of the Dragon and even at £15 it is good value for money and includes very clear instructions

You are never going to get real speech without extra hardware such as that used in the *Speech Synthesis Module* (JCB Microsystems) which is a cartridge giving very clear speech with only a slight transatlantic accent It uses a General Instrument SP0256 Speech Processor and a custom ROM containing predefined words

A clear manual is provided which explains in detail everything you could possibly want to know about the system The simplest method is to use the *Say* command which allows you to easily produce any of the predefined words For example, a polite computer might start by saying to the user

```
10 SAY HELLO 3 GOOD 3 MORNING 5 I 2 AM
   4 YOUR 4 DRAGON, 4 COMPUTER 5
20 SAY PLEASE 4 TYPE 4 YOUR 4 INSTRUC-
   TION 4
```

The *Say#* commands deals with numbers and is very impressive when you give it values like 123456789 which immediately comes out as "one hundred and twenty three million, four hundred and fifty six thousand, seven hundred and eighty nine' and if you add a zero to the end it instantly converts it to "1 23456789 exponent plus nine Equations like *Say 120 2/3* are allowed and it automatically rounds up after eight places

In addition you can use the 64 allophones (individual speech sounds) to create any word which is then called by the *Speak* command Using allophones takes some practice and experimentation to get the desired result but it extends the range of the module to an infinite vocabulary For example you might like to add the word "master' to that request for instructions

```
30 SPEAK MM AR SS TT2 ER1 4
```

The *Add* command allows you to mix *Say* and *Speak* to form likes like

```
40 ADD SAY BY 4 DRAGON 4 SAY# 32, SAY
   GAMES 1 SPEAK SS 4 MM AR, SS TT2,
   ER1 4 SAY o 3 K 4"
```

You can also *Say* or *Speak* strings and *Say#* variables As these commands do not halt the program you can mix speech and graphics very effectively and while the computer is actually speaking you can do almost anything else with it, except create sound or use the joysticks or cassette interface

It is obviously a great asset in education and in producing really user-friendly programs £37 95 is a fair price for this useful add-on ■

| Firm | Program | Cost |
|---|---|---|
| Compusense Ltd<br>PO Box 169<br>286D Green Lanes<br>London N13 5XA | *Edit+* | £34 (+Hi-res) |
| JCB Microsystems<br>29 Southbourne Road<br>Bournemouth BH6 5AE | *Speech Synthesis Module* | £37 95 |
| Microdeal<br>41 Truro Road<br>St Austell<br>Cornwall PL25 5JE | *Rainbow Writer*<br>*Dragon composer* | £20<br>£15 |
| Premier<br>208 Croydon Road<br>Anerly<br>London SE20 7YX | *Scribe* | £13 95 |
| Rampage<br>32 Birchwood Drive<br>Wilmington<br>Dartford<br>Kent PA2 7NE | *Picture Writer* | £10 |

# End of the line

***W R Masefield** explains how to calculate the frequency response of 4-terminal networks*

This program for the ZX Spectrum was developed to be a time saving aid in the calculation of voltage transfer ratios and input and output impedances of simple 4-terminal electrical networks containing resistance inductance and capacitance It is not an exhaustive treatment and is applicable only to networks which can be reduced to a sequence of senes and shunt sections of the general form shown in Figure 1

The method of calculation is by simple *A* matrices For those not familiar with matrix algebra the following brief account may be of help — for a fuller treatment, you should consult a textbook

Briefly any 4-terminal network having passive components — resistance (*R*), inductance (*L*) and Capacitance (*C*) — can be represented in the form of a 2 × 2 matrix (Figure 2) There are several ways in which the matrix can be made up For our purposes the one relating input voltage and current to output voltage and current (the so-called *A*-matrix), is the one to use (Figure 3) This has the advantage that, for a sequence of sections of a network, the overall matrix is the product of the individual section matrices taken in sequential order

$(A) = (A_1) \times (A_2) \times (A_3)$

Matrix multiplication follows a special rule as shown in Figure 4

Any series of shunt section can be represented by a simple matrix of the form shown in Figure 5 These matrices are then multiplied together to give the overall matrix Once the overall matrix has been found it is a simple matter to derive the frequency response of the complete network since the voltage transfer ratio is given by

$\frac{V_{OUT}}{V_{IN}} = \frac{1}{a_{11}}$ with output open-circuit.

and the input and output impedances by

$Z_{IN} = \frac{a_{11}}{a_{21}}$ with output open-circuit.

and

$Z_{OUT} = \frac{a_{22}}{a_{21}}$ with input open-circuit.

This program is easily adapted for other machines, as it makes no use of artful dodges On Run the user is asked to input the number of sections whether they are esnes or shunt and all the components of the sections in turn Where a particular component is absent a zero is entered For example if a section contains resistance only, then zero is entered for inductance and capacitance The computer recognises the zero to mean "no inductance or "no capacitance', *not* as a short-circuit or open-circuit condition

After putting in all the components the next prompt is for frequency As written the maximum frequency is 9 999 999Hz (almost 10MHz) — anything larger will exceed the print format

The program takes a few seconds to work out the answers, depending on how many sections have to be multiplied together After display the next frequency can be entered and so the response is gradually built up As an example, Figure 6 shows a simple network and the printout obtained for it ■

L  
C  
R  
Series  
Shunt

Fig.1

IN  
Network  
OUT

$$\begin{pmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{pmatrix}$$

A-Matrix

Fig.2

$$\begin{pmatrix} v_{IN} \\ i_{IN} \end{pmatrix} = \begin{pmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{pmatrix} \begin{pmatrix} v_{OUT} \\ i_{OUT} \end{pmatrix}$$

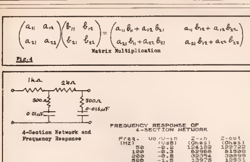
A-Matrix Equation

Fig. 3

Z  
Z

$$\begin{pmatrix} 1 & Z \\ 0 & 1 \end{pmatrix} \qquad \begin{pmatrix} 1 & 0 \\ 1/Z & 1 \end{pmatrix}$$

Fig.5



$$\begin{pmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{pmatrix}\begin{pmatrix} b_{11} & b_{12} \\ b_{21} & b_{22} \end{pmatrix} = \begin{pmatrix} a_{11}b_{11}+a_{12}b_{21} & a_{11}b_{12}+a_{12}b_{22} \\ a_{21}b_{11}+a_{22}b_{21} & a_{21}b_{12}+a_{22}b_{22} \end{pmatrix}$$

Matrix Multiplication

**Fig.4**



4-Section Network and Frequency Response

FREQUENCY RESPONSE OF 4-SECTION NETWORK

| Freq. (Hz) | Vo/V-in (VdB) | Z-in (Ohms) | Z-out (Ohms) |
|---|---|---|---|
| 50 | -0.2 | 124182 | 122722 |
| 100 | -0.3 | 62966 | 61508 |
| 200 | -0.8 | 32354 | 30899 |
| 500 | -1.5 | 13975 | 12531 |
| 1000 | -2.8 | 7830 | 6402 |
| 2000 | -5 | 4727 | 3330 |
| 6000 | -9.8 | 2795 | 1473 |
| 10000 | -14.6 | 2086 | 854 |
| 20000 | -19.4 | 1698 | 569 |

**Fig.6**

```
   5 REM NETWORK FREQUENCY RESPO
NSE
   5 REM © W.R.Hasefield 1983
  10 CLEAR . INPUT "No. of Secti
ons?",n
  20 DIM b(3*n). LET k=1
  30 LET s$="". FOR j=1 TO n  IN
PUT ("Section ",j," Series or Sh
unt?"),a$
  42 LET s$=s$+a$(2 TO 2)
  50 CLS   PRINT FLASH 1,AT 18,0
,"Enter zero for any R, L or C n
ot present"
  60 INPUT "Resistance? (Ohms)";
b(k),"Inductance?(Henries)",b(k+
1),"Capacitance?(Farads)",b(k+2)
  70 LET k=k+3  NEXT j
 100 CLS . PRINT "FREQUENCY RESP
ONSE OF"  PRINT TAB 5,N,"-SECTIO
N NETWORK"  PRINT
 110 PRINT "  Freq.  Vo/V-in   Z
-in   Z-out"
 120 PRINT "  (Hz)      (VdB)  (O
hms)  (Ohms)"
 130 INPUT "Frequency?(Hz)",f
 140 LET k=1  LET j=1  GO SUB 30
0
 150 LET c1=d1  LET c2=d2  LET c
3=d3  LET c4=d4
 160 FOR i=1 TO n-1  LET k=k+3·
LET j=j+1  GO SUB 300
 170 LET e1=c1*d1+c2*d3  LET e2=
c1*d2+c2*d4
 180 LET e3=c3*d1+c4*d3  LET e4=
c3*d2+c4*d4
 190 LET c1=e1  LET c2=e2  LET c
3=e3  LET c4=e4  NEXT i
 200 LET v=20*LN (1/e1)/LN 10  L
ET v=INT (v/.1+.5)*.1
 210 LET zi=INT (e1/e3+.5). LET
zo=INT (e4/e3+.5)
 220 PRINT TAB 6-LEN STR$ f,f,TA
B 11,v,TAB 24-LEN STR$ zi,zi,TAB
 32-LEN STR$ zo,zo
 230 GO TO 130
 300 REM Matrix SBR
 310 IF s$(j TO j)="h" OR s$(j T
O j)="H" THEN GO TO 390
 320 IF b(k)=0 THEN LET g=0  GO
TO 340
 330 LET g=1/b(k)
 340 IF b(k+1)=0 THEN LET bl=0
GO TO 360
 350 LET bl=1/(2*PI*f*b(k+1))
 360 LET bc=b(k+2)*2*PI*f  LET z
=1/SQR (g*g+ABS ((bl-bc)*(bl-bc)
))
 370 LET d1=1  LET d2=z  LET d3=
0  LET d4=1
 380 RETURN
 390 LET r=b(k)  LET xl=b(k+1)*2
*PI*f
 400 IF b(k+2)=0 THEN LET xc=0
GO TO 420
 410 LET xc=1/(2*PI*f*b(k+2))
 420 LET y=1/SQR (r*r+ABS ((xl-x
c)*(xl-xc)))
 430 LET d1=1  LET d2=0  LET d3=
y  LET d4=1
 440 RETURN
```

Fig 7

# Rudely interrupted

***Alan Went** unmasks some of the secrets hidden in the Spectrum interrupts*

The Z80 processor used in the Spectrum has a set of connections and instructions that allow the normal running of a program to be interrupted, and a subroutine called and Run before returning to the main routine

Two types of interrupt are allowed on the Z80 Firstly the non maskable Interrupt When the signal on this pin is activated, the processor will always jump to location *66H* and Run the routine there This is not used on the Spectrum

Secondly, the maskable interrupt A signal on this pin will cause one of three courses of action to occur depending on the interrupt mode selected In mode 1 the cpu executes an instruction provided by an external device This mode is not used on the Spectrum

Mode 2 is the normal Spectrum mode When an interrupt occurs, the cpu stores its current program address and jumps to location *38H* (56 dec) and continues from there The Spectrum routine here increments the Frames (Timer) variable, then reads the keyboard The hardware is arranged such that these interrupts occur every 20mS (50 times per sec)

When the interrupt occurs, the cpu forms an address using the contents of the *I* register as the high part of the address and the value placed on the data bus by the interrupting device as the lower part of the address The contents of the address so formed are used as the address to jump to Thus a table of subroutine start addresses can be held in memory, with the interrupting device combining with the *I* register to look up the appropriate address for that device If no data byte is placed on the data bus the cpu will read *FFH* (255 dec) and thus look at the address *I* * *256*+ *255* (and + 1 as a 16 bit address is required) and jump to the address stored there

When the Spectrum is running a Basic program and during editing the interrupts are enabled, and only disabled during time-critical routines such as *Save*/*Load* or when using the beeper Interrupt mode 1 is selected at all times, and the *I* register contains *3FH* (63 dec)

**Listing 1** *On/Off Routines* *Assembler*

| Addr | Code | Label | Inst. |
|---|---|---|---|
| FE56 | 3E09 | ON | LD A,9 |
| FE58 | ED47 | | LD I,A |
| FE5A | ED5E | | IM2 |
| FE5C | C9 | | RET |
| FE5D | 00 | | NOP |
| FE5E | 00 | | NOP |
| FE5F | 00 | | NOP |
| FE60 | 3E3F | OFF | LD A,3FH |
| FE62 | ED47 | | LD I,A |
| FE64 | ED56 | | IM1 |
| FE66 | C9 | | RET |
| FE67 | 00 | | NOP |
| FE68 | 00 | | NOP |
| FE69 | Interrupt Routine Starts here | | |

By changing the cpu into *IM2* we can cause the Spectrum to call our own machine code routines 50 times per second To do this, we need to set the *I* register to a value where the cpu can find a suitable address for our routine The value of *I* must in the Spectrum stay below *3FH* as it is used when outputting the display — setting *I* to above *40H* will give 'snow' on the screen

So, we need to find somewhere where the memory will always contain the same value, and that value will form part of a suitable address for our routine Looking through the Rom we find that if *I* = *9* then locations *09FF H*/*0A00 H* (2559/2560) contain the address *FE69 H* (65129) which is a suitable address for a routine in a 48K Spectrum For a 16K version *I* = *26H* produces a jump to *7E5C H* (32348)

Therefore by changing the value of *I* to 9 or 40, we can make the cpu call our own routines The routines in listing 1 show the method used to change/restore the *I* register and set the interrupt mode, so switching the interrupt routines on and off

Listing 2 is the Basic program we will be using to *Load* our routines into place Type it in and *Save* it, then Run To check the switching routine line 100 causes a jump back to the normal interrupt routine Try switching it on and off — the machine should not crash and no effect should be noticed

Note the first figure in the line 100 always equals the number of bytes to be poked into place

RAND USR 65116 (16K — 32330) turns ON RAND USR 65126 (16K 32340) — turns OFF

**Border** Add listing 3 to your base program and *Save* it as with all routines before Running This short routine sets the *Border* to be always the same as the permanent *Paper* colour — the demo program starting at line 200 shows this in action Enter as a direct command *Poke 65131, 120* (16K *32350*) and the *Border* will now flash as the contents of the timer (23672) is sent to the *Border*

**List 2(a)**

```
   1 REM List 2
  10 REM BASE PROGRAM
         INTERRUPT ON/OFF
  15 REM 48K SPECTRUM
  25 REM START INTERRUPT WITH
           RAND USR 65110
  28 REM END INTERRUPT WITH
         RAND USR 65120
  30 REM © Alan D. Went 1983
  40 CLEAR 65110
  50 FOR A=65110 TO 65128  READ
B  POKE A,B  NEXT A
  55 READ C  LET C=C+65128  FOR
A=65129 TO C  READ B  POKE A,B
NEXT A
  60 DATA 62,9,237,71,237,94,201
  70 DATA 0,0,0,62,62,237,71,237
,86,201,0 0
  90 REM INTERRUPT ROUTINE START
         AT LINE 100.
 100 DATA 3,195 56,00
```

**List 2(b) 16K**

```
   1 REM List 2 (b)
  10 REM BASE PROGRAM
         INTERRUPT ON/OFF
  15 REM 16K SPECTRUM
  25 REM START INTERRUPT WITH
           RAND USR 32330
  28 REM END INTERRUPT WITH
         RAND USR 32340
  30 REM © Alan D. Went 1983
  40 CLEAR 32329
  50 FOR A=32330 TO 32347. READ
B  POKE A,B  NEXT A
  55 READ C  LET C=C+32347. FOR
A=32348 TO C  READ B  POKE A.B
NEXT A
  60 DATA 62,40,237,71,237,94,20
1
  70 DATA 0,0,0,62,63,237,71,237
,86,201,0
  90 REM INTERRUPT ROUTINE START
         AT LINE 100.
 100 DATA 3,195,56,00
```

**Sound**. We can make the Spectrum beep continuously even when Running a program. Reload listing 2 and add listing 4. *Save* and Run, then Run line 200 (change values for 16K) and your Spectrum will sing to you!

If locations *65134* and *65137* (16K *32353* and *32356*) are *Poked* with other values as shown, the tone can be changed. The higher the number, the purer the tone, but the less time allowed to spend running the program and it runs very slowly.

**Break disable.** One disadvantage of Basic programs, at times, is that they can be stopped by pressing *Caps Shift/Space*. The next interrupt routine will disable that function. This works by checking the system variable *Errnr* for error code *L Break* into program. When this is detected the code for *Cont* is entered into the editing area and then, having ensured that the system variables *Oldppc* and *Ospcc* (see p175 Spectrum manual) are correct, a jump is made to the Rom routine that runs a direct command. This has the same effect as pressing *Cont* and *Enter* after a break. Thus, the program continues with the next statement.

To use this in your own programs, add listing 5 to the base program and merge into your program or, after running *Save* "*break*" *Code 65110,77* (16K *32330,77*). *Load* into your program after *Clear 65109* (*32329*). *Load "break" Code*. Adding the line *Rand Usr 65110* (*32330*) to your program will then turn the routine on.

List 3

```
  90 REM INTERRUPT ROUTINE START
        AT LINE 100.
  95 STOP
  99 REM border 48K or 16K
 100 DATA 15,245,58,141,92,15,15
 1?5 230,15,211,254,241,195,56,0
REM BORDER
 200 REM DEMONSTRATION PROGRAM
 210 RANDOMIZE USR 65110
 220 INK 0: FOR A=0 TO 7: PAPER
A: PRINT "The border changes col
our with paper! Without a BORD
ER command": PAUSE 100: NEXT a
 230 RANDOMIZE USR 65120
```

List 4

```
  90 REM INTERRUPT ROUTINE START
        AT LINE 100.
  95 STOP
  99 REM SOUND 48K OR 16K
 100 DATA 21,229,213,197,245,17,
16,0,33,16,0,205,181,03,241,193,
209,225,243,195,56,0: REM SOUND
 199 STOP
 200 REM DEMONSTRATION PROGRAM
 210 RANDOMIZE USR 65110
 215 PRINT "SPECTRUM SOUNDS"
 220 FOR A=120 TO 10 STEP -10: P
OKE 65134,a: PRINT "POKE 65134 =
 ";a: FOR b=100 TO 10 STEP -10: P
OKE 65137,b: PRINT ,"POKE 65137
";b: PAUSE 25: NEXT b: NEXT a
 230 RANDOMIZE USR 65120
```

List 5

```
  90 REM INTERRUPT ROUTINE START
        AT LINE 100.
  99 REM BREAK DISABLE 48K OR 16
K
 100 DATA 58,245,58,56,92,254,20
,40,4,241,195,56,0,205,176,22,42
,59,92,206,62,22,35,62,252,119,2
41,241,253,52,13,1,3,0,17,112,92
,33,60,92,253,203,10,126,40,1,9,
237,184,253,54,10,255,251,195,24
,16: REM break disable
 199 STOP
 200 REM DEMONSTRATION PROGRAM
 210 RANDOMIZE USR 65110
 215 PRINT "THIS PROGRAM CANNOT
BE BROKEN INTO! CAPS SHIFT AND
SPACE WILL ONLY PAUSE THE PROGR
AM "
 220 FOR A=1 TO 1000: PRINT AT 1
0,10;A: NEXT A
 225 PRINT AT 16,0;"THIS WILL WO
RK WITH ANY          BASIC PROGRA
M"
 230 RANDOMIZE USR 65120
```

Continued on page 23

**Moving display**. This routine is designed to show how the screen can be manipulated with an interrupt routine. The chosen lines of the display are moved one pixel to the left on each interrupt. This could be used, for example, to produce a moving landscape, with a game taking place overhead. The part of the screen that moves is a block up to eight lines deep, starting from the top, middle or bottom of the screen.

When listing 6 has been added, *Saved* and Run, *Poke 65137,(32353)* with the number of lines to be moved and *Poke 65135 (32351)* with

64 for top third of screen
72 for middle third
80 for bottom third

The program at line 200 (listing 6) gives some examples of this in action.

**Trace/Memory Free.** This last and longest routine gives the Spectrum a trace command. This places on screen the line and statement number as the program is Run — also the amount of unused memory. The speed that the program runs can be adjusted from 75 percent normal speed to very slow.

One line of the screen is cleared and used as the status line. The first number shown is the memory report. Direct commands are checked for and shown as line *0000 01*. The routine contains its own print routine, so that it will always function even with the printer running.

To use, *Poke 65199 (32418)* with the required speed (not above 40 approx), then turn the routine on. The speed can be changed when trace is on. After use in debugging, etc. it could be replaced in your final program with the break/disable routine previously described.

Note: to save code only, *Save "trace" Code 65110,176 (32330,176)* and reload as in the break/disable example.

In this article I have shown some of the ways in which interrupts can be used within programs — it is now up to you to improve them and write your own. When doing this, the following points must be borne in mind:

(1) Always *Save* the contents of any register that you use and restore it again before turning to the main routine.
(2) When an interrupt occurs, the cpu disables any further interrupt to prevent an interrupt service routine from being interrupted, thus forming an unbreakable loop. Therefore, always ensure that the *EI* (interrupt enable) command is used before returning to the main routine.
(3) If you require the Spectrum to read the keyboard and your routine does not do so, end with a *JP 0038H* — this will read the keys, etc — and then return to the main routine. Otherwise, end service routine with a *Return* instruction. ■

**List 6**

```
 98 REM INTERRUPT ROUTINE START
       AT LINE 100.
 99 REM MOVING DISPLAY
                       [illegible]
 100 DATA 47,229,213,197,245,33,
3,84,6,8,197,229,6,8,197,126,229
,245,1,31,0,64,93,35,237,176,241
,16,225,193,35,16,237,225,1,32,0
,9,193,16,225,241,193,209,225,19
5,56,0: REM MOVING DISPLAY
 110 REM
 120 REM POKE 65135 WITH
       64 FOR TOP SCREEN THIRD
       72 FOR MIDDLE SCREEN
       80 FOR LOWER SCREEN
 125 REM POKE 65137 WITH No. OF
LINES TO MOVE (MAX 8)
 130 REM
 150 STOP
 200 REM DEMONSTRATION PROGRAM
 215 CLS : POKE 65135,80: POKE 6
5137,8
 220 PLOT 0,0: DRAW 30,16,-1: DR
AW 50,15,.5: DRAW 60,-5,.75: D
RAW 26,1,-1: DRAW 13,1,.5: DRAW
20,-10,1
 230 DRAW 51,-2,.2: DRAW 15,-12
,1
 234 PRINT AT 21,1;"A MOVING LAN
DSCAPE"
 235 RANDOMIZE USR 65110
 240 PAUSE 500
 245 POKE 65135,72: POKE 65137,1

 250 RANDOMIZE USR 65120
 260 POKE 65135,72: POKE 65137,1
: PRINT AT 7,0;"THIS IS A DEMONS
TRATION    THIS IS A MOVING
MESSAGE   THIS IS A STILL MESSAG
E"
 270 RANDOMIZE USR 65110: PAUSE
400: RANDOMIZE USR 65120
 280 POKE 65135,64: POKE 65137,2

 290 PRINT AT 0,0;"THE DISPLAY W
ILL ONLY STOP TO   BEEP OR DURIN
G LOAD SAVE         AT OTHER TIME
S IT WILL MOVE"
 295 RANDOMIZE USR 65110
 300 PAUSE 100: BEEP 5,10: BEEP
5,30: PAUSE 100: RANDOMIZE USR 6
5120
```

**List 7**

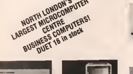
```
 99 REM TRACE [illegible]
 100 DATA 197,245,[illegible],229,33
,0,64,14,0,62,0,[illegible],119,35
,16,252,229,36,13,32,[illegible],237
 110 DATA 91,101,92,42,61,92,197
,237,82,17,16,0,209,225,254,17,2
[illegible]
 120 DATA 16,205,191,254,50,[illegible]
[illegible]
[illegible]
 130 DATA 229,33,0,64,[illegible]
[illegible]
[illegible]
 140 DATA 216,205,252,254,1,[illegible]
[illegible]
[illegible]
 150 STOP
 200 REM TO move status line to
bottom of screen run lines
      205 210
 205 POKE 65210,182: POKE 65220
,58
 210 POKE 65134,192: POKE 65178
,58
```

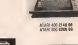
**List 7(b)**

```
 99 REM TRACE (16K)
 100 DATA 197,245,197,213,[illegible]
,0,64,14,0,62,0,[illegible],119,35
,16,252,229,36,13,32,244,[illegible]
 110 DATA 91,101,92,42,61,92,197
,237,82,17,16,0,209,216,126,17,0
[illegible]
 120 DATA 16,205,175,[illegible]
[illegible]
[illegible]
 130 DATA 229,33,0,64,[illegible]
[illegible]
[illegible]
 140 DATA 216,205,[illegible]
[illegible]
[illegible]
 150 STOP
 200 REM TO move status line to
bottom of screen run lines
      205 210
 205 POKE 32383,182: POKE 32384,
58
 210 POKE 32438,182: POKE 32439,
58
```

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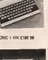
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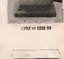
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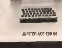


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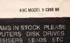


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# A cosmic experience

***Michael Pearce** presents a Cosmic Lander program written on OS 1 2 for model B or 32K A*

With a minimum amount of fuel left your space-craft is orbiting the planet below Gravity and strong cross winds are pulling your craft quickly down — the only hope you have of saving your ship is by landing it on one of the pressure pads

But this task will not be easy The slightest movement or too fast landing will lead to your ship being blown up Also cosmic stars float above the surface and on some occasions will cause an explosion On some screens landing pads do not appear so death is imminent no matter what happens The more screens you clear, the more intense the winds become

The program has full instructions and a signature tune The landing screen is drawn in hi-res colour graphics with stars and a 3D perspective graphics landscape Landing pads are randomly placed The ship is two characters high Fuel readout is at the top of the screen

Keys for the game are

Z Left
C Right
M Thrust

It is unwise to keep your hand on a key for too long Once the craft starts drifting too fast it will be hard to stop If you crash into the top or sides of the screen, your craft will explode

If the screen set-up is not to your liking, add this line

```
955 IF A$= P THEN GOTO 560
```

On the press of *P*, the screen will be redrawn, though the variables will stay the same

### Variables

| | |
|---|---|
| CA | Craft position across screen |
| CB | Craft position down screen |
| DRIFT | Wind force |
| DEC | Descent rate |
| CAB | Ships step of movement across screen |
| SN | Ships to go |
| SC | Score |

### Notes

| | |
|---|---|
| 10-230 | Instructions and signature tune |
| 240-330 | User defined graphics and sound effects |
| 350-560 | Set up screen display |
| 570-660 | Prints craft and waits for keyboard input |
| 900 730 | Deletes ship |
| 740-630 | Checks for crash or land |
| 250 900 | Crashes checks for end of game |
| 910 950 | Lands adds up score |
| 960 1000 | Updates instruments |
| 1010-1090 | End of game, wait for new start |

### Proc statements

| | |
|---|---|
| PROCscreen | Sets up screen |
| PROCcraft | Print craft waits for instructions |
| PROCmoving | Blacks out craft |
| PROCpos | Checks for crash or land |
| PROCcrash | Crashes craft |
| PROCland | Lands craft |
| PROCinst | Updates instruments |
| PROCend | Ends game |

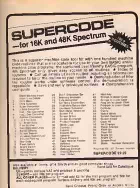
### Conversion to BBC model A

Delete lines 10 230
The following lines should read

```
320 MODE 5 VDU19 0 4 000 VDU23 8202 0 0
    0 VDU5
400 FOR N   1 TO20  X-RND(1240) Y=RND
    (780) + 200
410 Z=RND(2)+1 GCOL1 Z:IF Z=2 THEN MOVE
    X Y PRINTCHR$240
420 NEXT MOVE 0 0
520 GCOL0 3 MOVE N-2 250 DRAW N+75 250
750 IF POINT (CA+25 CB-26)=3 THEN 780 ELSE
    780
660 MOVE CA CB GCOL0 3 PRINT CHR$
    242 MOVE CA CB-32 PRINT CHR$243
```




Continued on page 28


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```
10REM "COSMIC LANDER BY Michael Pearc
  e"
20REM "PROGRAMMED ON THE BBC MODEL A
  32K OS. 1.2 IN APPROX 26K"
30MODE7:*FX15,0
40PRINTCHR$141;"COSMIC LANDER":PRINTC
  HR$141;"COSMIC LANDER"
50PRINTCHR$136,"BY Michael Pearce"
60PRINT'"MISSION TO LAND TO YOUR SPAC
  E CRAFT ON ASET UP PRESSURE PAD"
70PRINT'"FUEL IS LOW AND WHEN RAPPID
  PIPS SOUND  IT IS AT ITS MINIMIUM"
80PRINT'"THE MOON HAS A HEAVY CROSS W
  IND          WHICH DRIFTS YOUR ";
90PRINT"SHIP ACROSS THE SCREEN"
95PRINT"ALSO BEWARE OF FLOATING STARS"
100PRINT'"LAND CAREFULLY ANY MOVEMENT
  ON A"
110PRINT"PRESSURE PAD MIGHT LEAD TO AN
  EXPLOSION"
120PRINT'"KEYS...."
130PRINT"Z.....LEFT"
140PRINT"C....RIGHT"
150PRINT"M...THRUST"
160PRINT'"FUEL BONUS AFTER EVERY LANDI
  NG"
170REPEAT:READF,D:IF F=99 GOTO230
180IFF=0SOUND1,0,0,D ELSESOUND1,-10,F,D
190SOUND1,0,0,1
200UNTIL 0
210DATA56,4,80,24,88,24,96,32,0,4,96,4,
  100,16,100,0,96,12,80,4,96,0,80,32
220DATA99,0
230PRINTCHR$136;"Any key to start";:A=
  GET
240ENVELOPE2,16,16,1,1,200,0,0,126,0,0,
  -126,80,80
250ENVELOPE5,6,2,20,16,16,8,0,126,0,0,
  -126,126,126
260ENVELOPE1,1,1,1,1,5,10,60,80,-1,0,0,
  50,0
270VDU23,240,0,0,28,28,62,62,62,62:VDU
  23,241,62,62,62,127,127,127,93,93
280VDU23,242,0,16,16,16,16,68,56,254:V
  DU23,243,56,68,16,16,16,16,0,0
290VDU23,244,255,255,255,255,255,255,2
  55,255:VDU23,245,24,24,24,24,0,0,0,
  65
300VDU23,246,0,0,20,54,20,8,0,0,0
310SN=3:SC=0:W=3:A$=""
320MODE2:VDU19,0,4,0,0,0:VDU23;8202;0;
  0;0;:VDU5
330CA=200:CB=800:DRIF=RND(W)-(W/2):DEC
  =-10:CAB=0:FUEL=17
340CLS:VDU5
350PROCscreen
360PROCCRAFT:PROCMOVEING:PROCINST:PROCP
  OS
370GOTO360:GOTO330
380DEFPROCscreen
390GCOL0,7:MOVE0,0:DRAW0,900:DRAW1279,
  900:DRAW1279,0:DRAW0,0
400FORN=1TO70:X=RND(1240):Y=RND(720)+2
  00
410Z=RND(11)+1:GCOL1,2:IFZ=2THENMOVEX,
  Y:PRINTCHR$246
420MOVEX,Y:FLOT 69,X,Y:NEXT:MOVE0,0
430FORC=1TO3:FORN=1TO1700STEP100
440GCOL0,C:MOVE500,0
450PLOT85,N,RND(200-C*30)+200-C*70:NEXT
460MOVE0,0:PLOT85,1280,0:MOVE0,0:IFC=1
  THEN480ELSENEXT
470ENDPROC
480FORN=10TO1280
490IFPOINT(N,250)=1ANDPOINT(N+2,250)=0
  ANDPOINT(N+75,250)=0THEN510ELSENEXT
500GOTO540
510MOVEN-2,250:MOVEN+65,250:GCOL0,1:PL
  OT85,N+65,100
520GCOL0,6:MOVEN-2,250:DRAWN+75,250
530MOVEN-2,247:DRAWN+75,247:NEXT
540GCOL5,3:MOVE10,1005:PRINT"COSMIC LA
  NDER"
550MOVE10,955:PRINT"FUEL":MOVE0,0
560NEXT
570DEFPROCCRAFT
580GCOL0,5
590MOVECA,CB:PRINTCHR$(240):MOVECA,CB-
  32:PRINTCHR$(241)
600GCOL0,3:MOVECA,CB-32:PRINTCHR$(245)
610*FX15,0
620A$=INKEY$(20)
630IFA$="Z"THENCAB=CAB-3:SOUND0,1,4,5
640IFA$="C"THENCAB=CAB+3:SOUND0,1,4,5
650IFA$="M"THENDEC=DEC+3:FUEL=FUEL-1:S
  OUND0,-2,4,10
660IFA$<>""THENTIME=0:REPEATUNTILTIME=
  20
670IFA$=""THENDEC=DEC-1:CAB=CAB+DRIF
680ENDPROC
690DEFPROCMOVEING
700GCOL0,0
710MOVECA,CB:PRINTCHR$240:MOVECA,CB-32
  :PRINTCHR$241
720CA=CA+CAB:CB=CB+DEC
730ENDPROC
740DEFPROCPOS
750IFPOINT(CA+25,CB-70)=6THEN760ELSE780
760IFCAB<6ANDCAB>-6THEN770ELSEPROCCRASH
770IFDEC<10ANDDEC>-10THENPROCLAND ELSE
  PROCCRASH
780IFPOINT(CA+25,CB-70)=1ORPOINT(CA+20
  ,CB-60)=2THENPROCCRASH
790IFCA>1200THENPROCCRASH
800IFCA<10THENPROCCRASH
810IFCB>860THENPROCCRASH
820IFFUEL<1THENPROCCRASH
830ENDPROC
840DEFPROCCRASH
850MOVECA,CB:GCOL0,12:PRINTCHR$242:MOV
  ECA,CB-32:PRINTCHR$243
860SOUND0,5,4,20:SN=SN-1
870VDU4:PRINTTAB(2,10);"FUEL BONUS GON
  E":PRINTTAB(3,12);"CRAFTS LEFT ";SN
880TIME=0:REPEATUNTILTIME=700
890IFSN=0THENPROCEND
900GOTO330
910DEFPROCLAND
920GCOL0,14:MOVECA,CB:PRINTCHR$240:MOV
  ECA,CB-32:PRINTCHR$241
930GCOL0,12:MOVECA,CB-32:PRINTCHR$245
935*FX21,4
940SOUND1,2,0,40:VDU4:PRINTTAB(4,10);"
  FUEL BONUS ";FUEL
950TIME=0:REPEATUNTILTIME=700:SC=SC+20
  +FUEL:W=W+2:GOTO330
960DEFPROCINST
970VDU4:FORN=5TOFUEL:COLOUR7:PRINTTAB(
  N,2),CHR$244:NEXT
980PRINTTAB(N+1,2);" "
990IFFUEL<5THENSOUND2,-10,150,2
1000VDU5:ENDPROC
1010DEFPROCEND
1020VDU4:PRINTTAB(1,10);"   END OF GAME
1030PRINTTAB(3,12);"  SCORE ";SC;"     "
1040PRINTTAB(1,14);"KEY TO PLAY AGAIN"
1050*FX15,0
1060A=GET:RUN
```







# ADVENTURE GAMES

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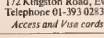
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# Unrestricted access

***Bernice Hennessy** explains how to obtain machine code access to Basic functions*

In his article "A Routine Matter" (*PCW* 20-26 October), Peter Whittaker describes a very useful technique for calling Basic Rom routines from a machine code program. In a similar manner you can access the functions of Basic and also any additional Basic commands provided, for example by disc operating systems or some hardware add-on modules.

To do this, you need to know that the Basic system uses a list of reserved commands and functions, together with their corresponding addresses. During Basic initialisation, pointers to these are set up in Ram as follows:

$120 Number of normal reserved words
$121 Address of normal reserved words list
$123 Address of statement despatch table
$125 Number of function reserved words
$126 Address of function reserved words list
$128 Address of function despatch table

Listings 1 and 1a are generalisations of Peter Whittaker's program which display both normal reserved words and Basic functions. You will see that the statement despatch table only contains *Exec* addresses for tokens up to 186 Renum, because later tokens are always used in conjunction with an earlier one. Functions are represented by a pair of tokens, the first always being *$FF*.

The lists of reserved words and the addresses of the subroutines to implement them are normally stored in the Basic Rom. The way in which extra commands are added to Basic (or existing commands given new meanings) is to move the reserved word list and despatch table (ie, list of addresses) into either protected Ram or the cartridge Rom area. It is then possible to redefine commands and their meanings as required. Listing 2 shows an example of this where the function reserved word list and function dispatch table have been moved into Ram and the following modifications made:

The INT and MEM functions no longer exist.
Token 255 129 has been redefined as QNT and points to $8C31 (the old MEM routine).
Token 255 158 has been redefined as % and points to $7CE5 in Ram where a machine code routine gives the function its meaning.

Using this technique, it is possible to redefine Basic words at will (although you change the meaning of existing words at your peril!) and to define meanings for extra Basic commands which you can add to your Dragon's repertoire. ●

```
5 REM DRAGON--BASIC TOKENS  BY B.HENNESSY
10 PRINT#-2
20 A=127:B=PEEK(289)*256+PEEK(290):C=PEEK(291)*256+PEEK(292):
   D=127+PEEK(288)
30 PRINT#-2,PEEK(288);"NORMAL RESERVED WORDS -- LIST BEGINS
   AT";B;" -- ADDRESSES BEGIN AT";C
35 T$="":B=B-1
40 GOSUB 200
50 PRINT#-2
60 A=127:B=PEEK(294)*256+PEEK(295):C=PEEK(296)*256+PEEK(297):
   D=127+PEEK(293)
70 PRINT#-2,PEEK(293);"FUNCTION RESERVED WORDS -- LIST BEGINS
   AT";B;" -- ADDRESSES BEGIN AT";C
75 T$="255 ":B=B-1
80 GOSUB200
90 STOP
200 PRINT#-2,"TOKEN";TAB(20)"BASIC";TAB(40)"EXEC ADDRESS"
205 PRINT#-2,TAB(41);"DEC.   HEX."
210 A=A+1:IF A>D THEN RETURN ELSEPRINT#-2,T$;A;TAB(20)" ";
220 B=B+1:IF PEEK(B)<128 THEN PRINT #-2,CHR$(PEEK(B));:
    GOTO220 ELSE PRINT#-2,CHR$(PEEK(B)-128);
230 E=PEEK(C)*256+PEEK(C+1):C=C+2:PRINT#-2,TAB(39)E;" "
    ;HEX$(E):GOTO210
240 END
```

Fig 1

34 FUNCTION WORDS -- LIST BEGINS AT 32460 -- ADDRESSES BEGIN AT 32563

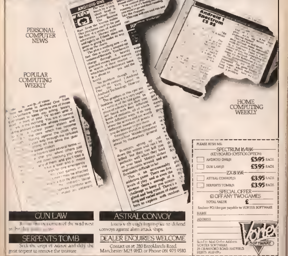
| TOKEN | | BASIC | EXEC ADDRESS DEC | HEX | TOKEN | | BASIC | EXEC ADDRESS DEC | HEX |
|---|---|---|---|---|---|---|---|---|---|
| 255 | 128 | SGN | 37925 | 9425 | 255 | 145 | CHR$ | 36346 | 8DD2 |
| 255 | 129 | QNT | 35889 | 8C31 | 255 | 146 | EOF | 47104 | B800 |
| 255 | 130 | ABS | 37950 | 943E | 255 | 147 | JOYSTK | 47885 | BB0D |
| 255 | 131 | POS | 39546 | 9ADE | 255 | 148 | FIX | 39254 | 9956 |
| 255 | 132 | RND | 38770 | 9772 | 255 | 149 | HEX$ | 40974 | A00E |
| 255 | 133 | SQR | 38551 | 9697 | 255 | 150 | LEFT$ | 36337 | 8DF1 |
| 255 | 134 | LOG | 37436 | 923C | 255 | 151 | RIGHT$ | 36366 | 8E0E |
| 255 | 135 | EXP | 38675 | 9713 | 255 | 152 | MID$ | 36373 | 8E15 |
| 255 | 136 | SIN | 38865 | 97D1 | 255 | 153 | POINT | 47684 | BA44 |
| 255 | 137 | COS | 38856 | 97C8 | 255 | 154 | INKEY$ | [illegible] | [illegible] |
| 255 | 138 | TAN | 38934 | 9816 | 255 | 155 | % | 31973 | 7CE5 |
| 255 | 139 | ATN | 39031 | 9877 | 255 | 156 | VARPTR | 39668 | 9AF4 |
| 255 | 140 | PEEK | [illegible] | 9296 | 255 | 157 | INSTR | 39460 | 9A24 |
| 255 | 141 | LEN | 36295 | 8DC7 | 255 | 158 | TIMER | 40231 | [illegible] |
| 255 | 142 | STR$ | 35904 | 8C40 | 255 | 159 | PPOINT | 42885 | [illegible] |
| 255 | 143 | VAL | 36444 | 8E5C | 255 | 160 | STRING$ | 39812 | 9B84 |
| 255 | 144 | ASC | 36326 | 8DE6 | 255 | 161 | USR | 40221 | 9D1D |

Fig 2

Continued on page 33

# "If you buy Android One, you can give up any hope of spending stress-free evenings with your Spectrum..."

HOME COMPUTING WEEKLY



78 NORMAL RESERVED WORDS — LIST BEGINS AT 32819 — ADDRESSES BEGIN AT 33108

| TOKEN | BASIC | EXEC DEC | ADDRESS HEX | TOKEN | BASIC | EXEC DEC | ADDRESS HEX |
|---|---|---|---|---|---|---|---|
| 128 | FOR | 33864 | 8448 | 187 | EDIT | 38268 | 8060 |
| 184 | GO | 34233 | 8589 | 168 | TRON | 39841 | 9AD9 |
| 13p | REM | 34326 | 8616 | 169 | TROFF | 39642 | 9ADA |
| 131 | | 34326 | 8616 | 170 | LINE | 42825 | A749 |
| 182 | ELSE | 34326 | 8616 | 171 | PCLS | 43200 | A8C8 |
| 133 | IF | 34375 | 8647 | 172 | PSET | 42735 | A6EF |
| 134 | DATA | 34323 | 8613 | 173 | PRESET | 42739 | A6F3 |
| 135 | PRINT | 36925 | 903D | 174 | SCREEN | 43618 | A9FE |
| 136 | ON | 34421 | 8675 | 175 | PCLEAR | 43545 | AA19 |
| 137 | INPUT | 34585 | 8729 | 176 | COLOR | 43220 | A8D4 |
| 138 | END | 34149 | 8522 | 177 | CIRCLE | 46624 | B236 |
| 139 | NEXT | 34697 | 8629 | 178 | PAINT | 44167 | AC87 |
| 140 | DIM | 38867 | 8AB6 | 179 | GET | 43768 | AAF0 |
| 141 | READ | 34679 | 8777 | 180 | PUT | 43763 | AAF3 |
| 142 | LET | 34486 | 886C | 181 | DRAW | 46137 | B061 |
| 143 | RUN | 34213 | 85A5 | 182 | PCOPY | 43710 | AABE |
| 144 | RESTORE | 34068 | 8514 | 183 | PMODE | 43459 | A9AF |
| 145 | RETURN | 34291 | 85F3 | 184 | PLAY | 44477 | ADBD |
| 146 | STOP | 34105 | 8531 | 185 | DLOAD | 41033 | A049 |
| 147 | POKE | 36568 | 8E8D | 186 | RENUM | 48442 | BDFA |
| 148 | CONT | 34144 | 8560 | 187 | TAB( | 21319 | 5347 |
| 149 | LIST | 36522 | 8EAA | 188 | TO | 52808 | CE48 |
| 150 | CLEAR | 34161 | 8571 | 189 | SUB | 20180 | 4ED4 |
| 151 | NEW | 33813 | 8415 | 190 | FN | 16706 | 4142 |
| 152 | DEF | 40065 | 9C81 | 191 | THEN | 54086 | D360 |
| 153 | CLOAD | 46884 | B7D4 | 192 | NOT | 20435 | 4FD3 |
| 154 | CSAVE | 46722 | B682 | 193 | STEP | 21078 | 524E |
| 155 | OPEN | 47144 | B818 | 194 | OFF | 58258 | C453 |
| 156 | CLOSE | 46868 | B74C | 195 | + | 28946 | 51D2 |
| 157 | LLIST | 38816 | 8EA4 | 196 | – | 19530 | 4C4F |
| 158 | SET | 47578 | B9D2 | 197 | * | 51013 | C745 |
| 159 | RESET | 47618 | BA03 | 198 | / | 22738 | 5808 |
| 160 | CLS | 47711 | BA5F | 199 | ^ | 21321 | 5389 |
| 161 | MOTOR | 47439 | B951 | 200 | AND | 52883 | CE43 |
| 162 | SOUND | 47770 | BA9A | 201 | OR | 20435 | 4FD3 |
| 163 | AUDIO | 47839 | BADF | 202 | > | 21569 | 5441 |
| 164 | EXEC | 46968 | B770 | 203 | = | 52801 | CE41 |
| 165 | SKIPF | 47134 | B81E | 204 | < | 21710 | 54CE |
| 166 | DEL | 48289 | 5081 | 205 | USING | 38849 | 5045 |
| 167 | EDIT | 38256 | 9965 | | | | |

34 FUNCTION RESERVED WORDS — LIST BEGINS AT 30286 — ADDRESSES BEGIN AT 33360

| TOKEN | | BASIC | EXEC DEC | ADDRESS HEX |
|---|---|---|---|---|
| 255 | 128 | SGN | 37925 | 9825 |
| 255 | 129 | INT | 38841 | 9489 |
| 255 | 130 | ABS | 37958 | 943E |
| 255 | 131 | POS | 39846 | 9ADE |
| 255 | 132 | RND | 38770 | 9772 |
| 255 | 133 | SQR | 28551 | 3987 |
| 255 | 134 | LOG | 37436 | 923C |
| 255 | 135 | EXP | 38675 | 9718 |
| 255 | 136 | SIN | 38865 | 97D1 |
| 255 | 137 | COS | 38853 | 97C8 |
| 255 | 138 | TAN | 38934 | 9818 |
| 255 | 139 | ATN | 39031 | 9877 |
| 255 | 140 | PEEK | 36582 | 8E96 |
| 255 | 141 | LEN | 36295 | 8DC7 |
| 255 | 142 | STR$ | 35904 | 8C40 |
| 255 | 143 | VAL | 36444 | 8E5C |
| 255 | 144 | ASC | 36326 | 8DE6 |
| 255 | 145 | CHR$ | 36305 | 8DD2 |
| 255 | 146 | EOF | 47104 | B808 |
| 255 | 147 | JOYSTK | 47580 | B9B0 |
| 255 | 148 | FIX | 38254 | 9956 |
| 255 | 149 | HEX$ | 40974 | A88E |
| 255 | 150 | LEFT$ | 36337 | 8DF1 |
| 255 | 151 | RIGHT$ | 36366 | 8E0E |
| 255 | 152 | MID$ | 36373 | 8E15 |
| 255 | 153 | POINT | 47684 | BA44 |
| 255 | 154 | INKEY$ | 46998 | 5786 |
| 255 | 155 | MEM | 35889 | 8C31 |
| 255 | 156 | VARPTR | 39658 | 9AF4 |
| 255 | 157 | INSTR | 39950 | 9884 |
| 255 | 158 | TIMER | 48281 | 9898 |
| 255 | 159 | PPOINT | 42936 | A8C7 |
| 255 | 160 | STRING$ | 39812 | 9834 |
| 255 | 161 | USR | 40221 | 901D |

Fig 1a





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# A registered connection

*Pete Gerrard takes a look at some of the registers connected with the Sid chip*

Last week I gave you some of the fundamental information regarding the use of the 6581 Sid chip in your Commodore 64

While space precludes an in-depth look at everything connected with the chip, this week we're going to take a detailed look at just some of the more interesting registers starting with register 54276

At this point it would be useful to dig out last week's copy, and have the Sid memory map in front of you

### Control Register

This is the most important register of them all containing eight control bits with the following functions

### Gate — Bit 0

This controls the envelope generator for voice 1 and when this bit is set to a '1' the envelope generator is triggered and the Attack/Decay/Sustain (or ADS) cycle is begun

When this bit is reset to a zero, then the release part of the cycle begins

This envelope generator controls the amplitude of voice 1 as it appears at the audio output and must therefore be triggered in order for the selected output of voice 1 to be audible

### Sync — Bit 1

When set to a '1' this synchronizes the fundamental frequency of voice 1 with the fundamental frequency of voice 3 producing what are known as 'hard sync' effects

Varying the frequency of voice 1 with respect to voice 3 produces a wide range of complex harmonic structures from voice 1 at the frequency of voice 3

In order for this to take place, obviously voice 3 must be set to some frequency or other, preferably lower than that of voice 1, but naturally higher than zero Nothing else connected with voice 3 has any effect on Sync

### Ring Mod — Bit 2

When set to a '1' this bit replaces the triangle waveform of voice 1 with a ring modulation combination of voices 1 and 3 obviously one must previously have selected the waveform of voice 1 to be a triangle one!

Varying the frequency of voice 1 with respect to voice 3 produces a wide range of non-harmonic overtone structures Again nothing else connected with voice 3 has any effect on Ring Mod

### Test — Bit 3

This bit, when set to a '1' resets and holds voice 1 at zero until the bit is cleared

The noise waveform of voice 1 is also reset, and if a pulse wave has been selected this is held at a DC level

### Triangle — Bit 4

When this is set to a '1' the triangle waveform is selected for voice 1 This is low in harmonics, and thus produces a mellow reed like note

### Sawtooth — Bit 5

When this is set to a '1', the sawtooth waveform is selected for voice 1 This is rich in harmonics and thus produces a brassy, trumpet-like note

### Pulse — Bit 6

When this is set to a '1' the pulse waveform is selected for voice 1. The harmonic content of this waveform can be varied by altering the pulse width registers, producing a wide variety of different musical (and not so musical) sounds

Sweeping through the pulse widths can produce some dynamic effects and add a sense of motion to the sound Also worthy of experiment is a rapid altering of pulse widths

### Noise — Bit 7

When set to a '1' the noise waveform is selected for voice 1 This is a totally random signal which changes at the frequency of voice 1 and thus is of most use in generating purely sound effects like missiles taking off engines revving or explosions

One of the above waveforms must be selected in order for voice 1 to produce any audible sound, although that sound can be turned off without un-selecting a waveform, as the voice at the end is a function of the envelope generator only

You cannot add more than one waveform together to produce something totally different from the above four, although you're welcome to try!

### Filtering techniques

This concerns memory locations 54293 and 54294, known as Freq Lo/Freq Hi — registers $15 and $16

As bits 3 to 7 of register $15 are not used, these two combine together to form an 11-bit number which linearly controls the cut-off or centre frequency of the programmable filter The approximate cut-off frequency is obtained from

FCout = ((6.6E − 8 + FCn • 1.28E − 8)/C) Hz

where FCn is the 11-bit number in the above two registers and C is the value of the two filter capacitors connected to pins 1 to 4, or in our case 2200 picoFarads

This gives an approximate filter range of 30 Hz to 12 KHz, according to

FCout = (30 + FCn • 5.8) Hz

### Res/Filt — Register $17 (54295)

Bits 4 to 7 of this register control the resonance of the filter, where resonance emphasises components of the frequency at the cut off frequency of the filter thus causing a sharper sound

There are 16 resonance settings ranging linearly from no resonance when this is set to zero, or maximum resonance when it is set to 15

Bits 0 to 3 determine which signals will be routed through the filter

Bit 0 When this is set to zero voice 1 appears directly at the audio output and there is no filtering effect When set to 1, voice 1 is processed through the filter and the harmonic content of voice 1 is altered according to the selected filter parameters

Bit 1 Ditto for voice 2

Bit 2 Ditto for voice 3

Bit 3 Ditto for external audio input on pin 26

### Mode/Vol — Register $18 (54296)

Usually referred to as the master volume control, this actually does a whole lot more

Bits 0 to 3 are the actual volume settings and allow you to select an overall volume ranging from 0 (silence) to 15 (maximum)

Bits 4 to 7 select various filter modes and output options

Bit 4 When set to a '1' the low pass output of the filter is selected and sent to the audio output For a given filter input signal all components of the frequency below the filter cut off are passed through unaltered whilst all those above the cut-off are attenuated at a rate of 12 decibels per octave

Bit 5 As above for band pass output but attenuation above and below the cut-off is at a rate of 6 decibels per octave

Bit 6 As above for high pass output, and attenuation below the cut-off is back to 12 decibels per octave

Bit 7 When this is set to '1' the output of voice 3 is disconnected from the direct audio path so setting voice 3 to bypass the filter and setting 3 OFF to a '1' stops voice 3 from reaching the audio output Thus voice 3 can be used for modulation purposes without any extraneous noises coming out

These filter modes are additive in that one can combine a number of different modes at the same time Playing with and understanding these frequency alterations is the key to getting the most out of the 6581

I have not given you any concrete examples here so you'll just have to sit down and do it for yourself But, armed with the above information about how the important registers can be altered for filtering, synchronisation and other techniques the 6581 Sid chip should begin to reveal just a few of its secrets to you ■


Cuthbert Goes Walkabout
Cuthbert is on
the Lunar Landing
Pad, waiting for the Federal
State Visit. He must turn the
by walking across the swit
located at the corners of the
before the invading Moron
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he tackles the next "Pad"
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FEELING PECKISH, HE WAS TEMPTED BY A MOUTH-WATERING SNACK DANGLING BEFORE HIM. BEWARE MIRTHFUL HERO.....
MMM!! A MACWIMP CRAB-BURGER
THE LAUGHING SHARK, TIRED OF WET WINDY AND BLACKED-OUT PENGE, HEADED FOR SUNNY CLIMES.........
IT'S ANGLER AFTER A BITE!
A FLYING SHARK !!!??
WRONG AGAIN!! IT'S RIDER PARACHUTING HIS WAY TO A TOP SECRET MISSION TO CHECK OUT MINED ROADS-FIRST HAVING TO LAND ASTRIDE A MOTORBIKE
BETTER NOT DISTRACT HIM! ANY MISTAKES COULD PROVE PAINFUL - EVEN FATAL.....
GERONIMO
NO OLD BOY, THE LAUGHING SHARK ACTUALLY
FROM HIS TRUSTY TRAWLER, ANGLER NEARLY HOOKED OUR HERO, WHO DECIDED IT WOULD BE SAFER IN THE AIR........
AW NUTS!!
LATER
AN EXPLOSIVE SITUATION!
OUR HERO WOULD BE BETTER OFF CATCHING THE VIRGIN BUS CHECKING OUT ALL THE FAB NEW GAMES.
TICK TOCK
ROAD CLOSED UNEXPLODED BOMB
HIGH OVER METROPOLIS DISASTER HAS STRUCK. A NEW BUILDING HAS COLLAPSED AND SCAFFOLDING SID'S ONLY HOPE IS TO PLANKWALK TO SAFETY-BUT WATCH OUT FOR MONSTERS!!
LIFE IN THE AIR IS A LITTLE TOO EXCITING.
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THAT'S GOLD IN THEM THAR HILLS
GO ON FIN FACE! NOC-A-BLOC SPLAT A SPOD!!!
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THERE'S A LEGEND HEREABOUTS THAT SOMEWHERE IN TOWN ARE THE CLUES TO FIND THE MAP SHOWING OLD JAKE'S MINE.
GHOST TOWN
JAKES MINE
MAP
DESERT
THERE'S NO BOVVER WHEN YOU HOVVER
FULL OF TIME BOMBS—FLAGS, MINES AND...... WATCH OUT!! BOVVER BOOTS. WHAT A CRUNCHER!!
NOT MUCH WATER IN THESE PARTS A SHARK COULD DIE OF THIRST... BEFORE STRIKING IT RICH.
LEAVING THE DESERT BEHIND, CHORTLE CHOPS FOUND HIMSELF IN A STRANGE LAND....
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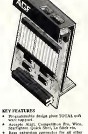
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# A crowded market

***Andrew Pennell** takes his Sord in both hands and enters the cut and thrust world of the under-£200 computar markat*

The CGL M5 is yet another contender in the crowded sub £200 computer market It is manufactuted by Sord in Japan and sold in this country by CGL known for their *Game & Match* toys

The standard M5 machine costs £149 95 and comes with 20K Ram and 16K Rom This is not as attractive as it first seems as 16K of the Ram is dedicated to the video display leaving only 4K for the user Of the Rom, 8K is contained in the machine as the operating system, while a further 8K is supplied in the Basic I plug in cartridge Supplying the main language on a detachable cartridge is a very good idea, as it can be changed or upgraded Something which may be rather necessary on the M5

The main unit is little larger than the Spectrum, though rather heavier It is in pleasant two-tone colours with a detachable flap that occupies the rear third of the top The flap has to be removed when the machine is in use as it covers the cartridge slot. The cartridges themselves are exactly the same size as cassette boxes, and they fitted into my cassette rack perfectly The keyboard is one of the popular (with manufacturers anyway) moving rubber key types, but is much nicer to type on than the Spectrum Each key is shaped as a square with a corner removed for some inexplicable reason and there are even 55 keys removing the need for the complicated shifts required on the Spectrum s 40 keys Unfortunately there is no space bar and the space key is just under the *Return* key, which is not really a good place for it It also has two *Shift* keys, a *Ctrl* key, a *Func* key (for single-key entry) and a *Reset* key which sensibly also requires *Ctrl* to be pressed Each key has the main symbol in white any keywords in yellow and graphic symbols in blue As the keys themselves are also blue, it makes the graphics all but invisible under normal light

Along the back of the case are the power and cassette sockets, a Centronics printer socket, two joystick sockets tv output and video and audio outputs Regrettably the joystick sockets are non-standard so only the CGL joypads will fit This is a problem since they are not very good

The power supply is a huge black slab that has to sit next to the main unit because of its short lead — aesthetically pleasing it is not, but thankfully it is silent

Inside the case there is only one circuit board containing the electronics It is well concealed under a considerable weight of metal shielding which really does cut down on radio interference — Sinclair please note Among the components are the Z80A microprocessor the Texas 9929 video chip, a Z80 CTC timer chip a 76489 sound chip, and an 8K *Rom* The CGL M5 uses the same video chip as that in the now defunct TI 99/4A, the new Memotech MTX500 (see *Popular Computing Weekly*, November 17), and the forthcoming MSX-standard series machines The sound chip is the same as that used by the BBC micro and the Memotech

Because of its apparent similarities with the Memotech I was very interested in the display quality on the M5 The machine initialises to white letters on a black background, and appears twice on the tv dial — there was no discernible difference between the two Unlike the Memotech, all the characters were visible on the screen, but it was similar in the way the picture distorts 'CinemeScope fashion so that circles are oval in shape Colour stability was better than the Memotech, and the sound quality very much better

The M5 is supplied with the Basic-I Rom cartridge which CGL say is Easy BASIC for Beginners I can only presume that the I in the name means in fact Basic for Idiots!

The first thing I did with the computer was to type in a three-line program to print the character set and it would not run After Listing it I found that the word *Let* had been inserted before each statement. After examining the manual I discovered that if a space is not entered after each line number then *Let* is inserted — it is claimed that this is done so that you do not have to type *Let*, but it seems ridiculous to me Spaces are also required to seperate commands, else they are not accepted Normally commands have to be typed in letter by letter, but if the *Func* key is held down with certain letters a whole keyword is generated This single-keyword entry is optional but again if you don t press *Space* after each keyword the line will not run

Lines are edited using a fairly standard screen editor, using the cursor keys in conjunction with *Ctrl* Insert mode can be entered with *Ctrl P* and left with *Ctrl O* Delete works — in the opposite way to the norm — removing the character to the right of the cursor — but this seems to be getting more popular and one soon gets used to it Program lines can be entered in either upper or lower-case and are listed in upper-case A wide range of graphics characters can be accessed direct from the keyboard though the manual has to be referred to as half the legends are missing and the other half are illegible due to the colour clash of the keys and keyboard already mentioned Control codes can also be entered in listings by holding *Shift Ctrl* and the appropriate key, and they get listed as inverse characters The codes are important since they control the different screen modes

The Basic itself is rather unusual in that it is integer-only This means that no decimals are allowed and numbers are limited to the range ± 32767 The last micro I can remember that was integer only was the Acorn Atom some years ago After thinking about it though for a beginner integer-only is probably sufficient The best part of Basic-i is its speed — it is incredibly fast Simple tests showed it to be at least four times faster than the Spectrum, and marginally faster than the BBC! Its speed is obviously due to the integer limitation The commands are fairly standard, with some additions for graphics

The M5 has four graphics modes The simplest is Text, which is 40 × 24 characters in two colours Graphics Mode 1 has a resolution of 256 × 192 pixels but only a maximum of 256 characters can be displayed, each with a foreground and background colour chosen from a palette of 16 colours Graphics Mode 2 the most useful, has the same resolution, but the screen is fully bit mapped in colour giving a colour resolution of 64 × 192 Finally multi-colour mode in which each pixel can be any of 16 colours, has a resolution of only 64 × 48 and is really not at all useful

The best feature of the Texas 9929 chip and thus the M5 is its ability to display and control large graphics shapes — Sprites All of the above modes except Text can support up to 32 Sprites each of size up to 32 × 32 pixels which are independent of the graphics screen, and can be one of 16 colours

Basic-I has only a few commands for accessing the graphics, and none are explained in detail or at all clearly in the manual To switch between graphic modes certain control codes have to be printed and this is certain to confuse the beginner If for some reason an error occurs in some of the modes the error message will be invisible, and the computer appears not to be working This is particularly a problem in Multi-colour or Graphics 2 modes, as characters are not printed sensibly in either The manual unwisely advises that the power be removed if the screen displays meaningless characters, but this is simply not so Eventually after pressing complicated *Ctrl* sequences control can be regained

Once in a particular graphic mode there are a handful of commands to define the shape colour, size and position of the Sprites but their use is poorly explained in the manual s Appendix There are no

commands to plot points or draw lines or to use the sound chip

This would not be a great problem if CGL provided sufficient technical information to allow access by *Pokes*, *VPokes* (for the video Ram) and *Outs*, like Commodore do, but no mention is made I was most unimpressed with the CGL M5 until I typed in a demonstration program from the back of the manual It produced a rather impressive game in colour with Sprites and background characters. The listing was full of *Pokes* and other such commands, but no explanation of them was given It also showed how to use the sound chip using an Out instruction but, again, no details were given At this stage I realised the CGL had a lot of potential, but I could not get to it.

Then I managed to get hold of a copy of the Basic-G cartridge

Basic-G, at £34 95, is a cartridge that comes in a huge plastic box, with foam padding to fill it, and a massive 280-page manual Noticeably heavier than Basic-I it contains 16K of Rom and an extra 4K of Ram *On* the front of the manual are the words 'Easy Basic for Games' and, after examining the contents, it certainly seemed like it

As well as all the Basic-I commands, Basic-G adds over 50 new ones, mainly for graphics The graphics modes (except the useless Multi-colour mode) are very well supported with easy colour commands pixel plots line drawings circles ovals and even polygons There is a powerful *Paint* command which is extremely fast and fills in any irregular shape with solid colour The commands Bar and Box are given for drawing line and solid rectangles For controlling the Sprites there are a wealth of commands the most impressive of which is *Move* it allows movement to a given point at a given speed, or movement in a given direction at a given speed A maximum of twelve Sprites can be moving together, automatically, at one time, though others can be moved using *For Next* loops There is a limitation, not mentioned in the manual — only four Sprites can be on a given horizontal line That information I discovered in the Memotech manual The *Joint* statement allows Sprites to be joined together to make bigger shapes. To detect collisions between Sprites there is a command *On Coinc Gosub xxx* and if any two Sprites touch each other then routine *xxx* is executed These graphic commands make it simple to write complicated games and they run fast, too

As well as the extra graphics commands Basic-G also supports the sound chip On the M5 the sound output is through the tv speaker and it is nice and



clear The commands for using it are *Play*, for music and *Sg*, for sound effects The M5 has three tone channels and one noise channel — all easily used Basic G The *Play* command is used in a similar way to that on the Dragon 32, but can address all three channels It is not just the note that can be controlled So can the octave duration, volume, tempo and envelope The control commands are all clearly explained even to musical ignoramuses like myself The *Sg* command can also be used to control the tone generators, but that requires more work

To aid easy programming, there are several levels of 'interrupts'. Normally these are only available on other machines via machine-code An interrupt is an occurrence that stops normal program flow for a while, while it does something else, when the extra routine has finished the normal program flow is resumed

*On* the M5 there are six types of interrupts controllable from Basic G *On Coinc Gosub* has already been mentioned The others are *On Event Gosub* and *On Alarm Gosub*, which trigger on certain timed occurrences, *On Key Gosub* used when a key is pressed *On Joy Gosub*, when a joypad is moved, and *On Error Gosub* when any error occurs This type of interrupt management is a brilliant idea, and deserves to be duplicated on the next generation of home micros.

*On* the back of the M5 is a socket for a printer cable of the Centronics type When a printer is connected both listings and text are available by *LList* and *LPrint* commands Also available is the *PCopy* command which copies the hi-res screen to an attached printer, using parameters set up with the *PMode* command From what I could see, it should work with any dot-matrix printer that has a bit-mode with 8 dots such as the Epson machines It would appear, however, to rule out the popular Seikosha GP100

Although Basic G has a large number of good features it still has the idiosyncrasies of Basic-I Spaces are still required in lines (except after line numbers) error messages are still just numbers and, incredibly, it is still integer-only

Just before writing this review I received the M5 Technical Manual which I hoped would cover all the omissions from the Basic manuals Unfortunately 'Technical Manual' is not really accurate — most of it is just the Appendix from the Basic-G manual There are a couple of pages devoted to I/O locations, a vague memory map and a circuit diagram, but actual details of the graphics and sound chips are almost non-existent.

In fact, M5 owners who want to know more should try and get a Memotech manual as it contains all they should need There is little mention of machine-code in any M5 document and information is particularly lacking on the system variables and where to put the code in memory For independent support a machine needs to have certain technical information available as Texas found to their cost and CGL don't seem able to supply nearly enough

The standard M5 machine with Basic-I and 4K user Ram seems expensive at £150 I thought only Commodore could get away with omitting the extra commands to use machines (eg, the Commodore 64 and Simons Basic), but CGL obviously seem to think that they can too

There is a paragraph in the technical manual that says 'Basic-I is not designed to bring out all the M5 capabilities The built-in synthesiser requires much time to produce sounds and the fine colour graphics are difficult to produce on the screen' I wholeheartedly agree No such statement appears in CGL's adverts though With Basic G and 6K user-Ram it should really be compared with the 16K Spectrum but costs £185, making the CGL less attractive However Basic-G is a brilliant games writing language (except for the inexcusable lack of floating-point numbers), even though writing similar programs from machine-code is almost impossible with the current level of technical data

There is supposed to be a 32K Ram pack coming shortly If CGL were to sell the 32K Ram pack together with Basic G and the M5 Console at a discount it could make an attractive package

My feeling is that there are already too many machines competing for the sub £200 market CGL will have to change their current tactics if they wish to start the long heralded Japanese Invasion by supplying Basic-G as standard And that's just for starters Independent support will be slow in coming without more technical information being easily available ■

**Open Forum is for you to publish your programs and ideas. Take care that the listings you send in are all bug-free. Your documentation should start with a general description of the program and what it does and then give some detail of how the program is constructed. We will pay the Program of the Week double our new fee of £6 for each program published.**

## Frequency

### on Spectrum

This program draws frequency graphs of the sound being received at the ear socket.

First enter the small basic program and save it using the line

*Save* "Sound *Line* 5

*New* the computer then enter and *Run* the hex loader program. Use this program to enter the 93 bytes of hex code which constitutes the main program. The hex is the second column of figures starting 110501. When all the code has been entered input 'STOP' to stop the program then save the machine code using the line

*Save* Sound *Code* 65000.100 *New* the computer then rewind the tape and load the basic program. When loaded it will automatically load the machine code and then stop.

The easiest way to use the program is to first record the sound you want analysed onto tape. Run the program and after the tone the computer waits for a signal at the ear socket. Connect the tape recorder as for loading and play. The computer will store values corresponding to the frequency at location 60000 to 60254.

The program will then draw a simple time versus frequency graph of the values. Press enter to run the program again. Owners of Casio VL-Tones can connect the instrument directly to the ear socket for analysing the waveforms produced by the instruments *Adsr* function.

```
                ORG   65000
                LOAD  65000
FDE8 110501             LD    DE,261
FDEB 216606             LD    HL,1638
FDEE CDB503             CALL  949
FDF1 DBFE         L1    IN    A,(254)
FDF3 FEFF               CP    255
FDF5 28FA               JR    Z,L1
FDF7 2160EA             LD    HL,60000
FDFA 06FF               LD    B,255
FDFC C5           L2    PUSH  BC
FDFD 1600               LD    D,0
FDFF 06FF               LD    B,255
FE01 DBFE         L3    IN    A,(254)
FE03 FEFF               CP    255
FE05 2001               JR    Z,L4
FE07 14                 INC   D
FE08 10F7         L4    DJNZ  L3
FE0A 72                 LD    (HL),D
FE0B 23                 INC   HL
FE0C C1                 POP   BC
FE0D 10ED               DJNZ  L2
FE0F 00                 NOP
FE10 3E02               LD    A,2
FE12 CD0116             CALL  5633
FE15 CD6B0D             CALL  3435
FE18 3E02               LD    A,2
FE1A CD0116             CALL  5633
FE1D D9                 EXX
FE1E E5                 PUSH  HL
FE1F D9                 EXX
FE20 3E00               LD    A,0
FE22 F5           L5    PUSH  AF
FE23 4F                 LD    C,A
FE24 0600               LD    B,0
FE26 CDE522             CALL  8933
FE29 2160EA             LD    HL,60000
FE2C C1                 POP   BC
FE2D C5                 PUSH  BC
FE2E 48                 LD    C,B
FE2F 0600               LD    B,0
FE31 09                 ADD   HL,BC
FE32 46                 LD    B,(HL)
FE33 0E00               LD    C,0
FE35 110101             LD    DE,257
FE38 CD8A24             CALL  9402
FE3B F1                 POP   AF
FE3C 3C                 INC   A
FE3D FEFF               CP    255
FE3F 20E1               JR    NZ,L5
FE41 D9                 EXX
FE42 E1                 POP   HL
FE43 D9                 EXX
FE44 C9                 RET
                END
>R
HEX LOADER

  10 DEF FN A$(A)=CHR$ (A+48+7*(A>9))
  20 DEF FN B$(A)=FN A$(INT (A/16))+FN A$(A-16*INT (A/16))
  30 DEF FN C$(A)=FN B$(INT (A/256))+FN B$(A-256*INT (A/256))
  40 DEF FN A(A$)=CODE A$-48-7*(A$>"9")
  50 DEF FN B(A$)=16*FN A(A$(1))+FN A(A$(2))
 100 LET N=65000: LET D$=""
 110 IF D$="" THEN PRINT : PRINT FN C$(N),"  ";: INPUT D$
 120 POKE N,FN B(D$)
 130 PRINT D$( TO 2);
 140 LET N=N+1: LET D$=D$(3 TO )
 150 GO TO 110

BASIC PROGRAM

   1 BORDER 1: PAPER 0
   2 INK 6: CLS
   3 RANDOMIZE USR 65000
   4 INPUT A$: GO TO 3
   5 LOAD ""CODE
```

**Frequency**
*by Chris Eckersley*

## Screen Block Delete

### on Spectrum

This machine code routine is designed to help you clear parts of the screen without damaging another part which you may want to leave on.

The program will clear any line(s) or column(s) the user specifies. To use the routine do the following *Pokes*

27004 With the first column to clear — 1
27008 With no. of columns to clear
27014 With no. of lines to clear
27016 With specified paper colour

As the programe stands it will *Poke* in the machine code and then *List* the program three times and delete the top left-hand corner of the screen.

This program can be used when, for example, some instructions need to stay on the screen whilst others need not.

```
   1 REM ************************
   2 REM **Screen Block Delete**
   3 REM **   By D.Parkinson   **
   4 REM ************************
   5
8990 REM  *SAVE CODE BY TYPING*
8991 REM SAVE name CODE 27000,26
8992
9000 FOR g=27000 TO 27025: READ a: POKE g,a: NEXT g
9010 DATA 17,32 9,30,235 97 229,6,16 225,35,220 197,6 12 54 63 237,90,16,250,193 16,241,225,201
9020 LIST : LIST : LIST : LET l=USR 27000
```

**Screen Block Delete**
*by D Parkinson*

## Shoot Out

### on Vic20

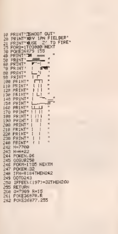
You are a gunman. When an object appears in front of you, you must shoot as quickly as you can by pressing Z. After you have shot your gunman will blow his gun.

### Program notes

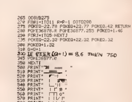
10-25 Introduction
30-240 Prints man on screen
242-255 Moves object
260-345 Moves bullet and sound effects
500-700 Print man blowing gun
710-770 Prints Got it

### Variables

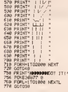
N Object position
O The bullet



```
10 PRINT"SHOOT OUT"
20 PRINT"BY IAN FIELDER"
21 PRINT"USE  Z' TO FIRE"
25 FORQ=1TO3000 NEXT
30 POKE36879 155
40 PRINT"          "
50 PRINT"          "
60 PRINT"          "
70 PRINT"          "
80 PRINT"          "
90 PRINT"   | |    "
100 PRINT"          "
110 PRINT"  | ||   "
120 PRINT"  | ||   "
130 PRINT"  | |_|  "
140 PRINT"          "
150 PRINT"          "
160 PRINT"          "
170 PRINT"  | | ||  "
180 PRINT"  | |||  "
190 PRINT"  | |||  "
200 PRINT"  |   |  "
210 PRINT"  |   |  "
220 PRINT"  |   |  "
230 PRINT"  |   |  "
240 PRINT"  |   |  "
242 N=7700
243 N=N+22
244 POKEN,86
245 GOSUB250
246 FORM=1TO5 NEXTM
247 POKEN 32
248 IFN=8164THEN242
249 GOTO243
250 IFPEEK(197)=32THEN260
255 RETURN
260 Q=7909 R=15
261 POKE36878,R
262 POKE36877,255
```



```
265 GOSUB275
270 FORI=1TO11 R=R-1 GOTO280
275 POKEQ-22,78 POKEQ+22,77 POKEQ,42 RETURN
280 POKE36878,R POKE36877,255 POKEQ+1,46
290 FORJ=1TO5 NEXTJ
295 POKEQ-22,32 POKEQ+22,32 POKEQ,32
300 POKEQ+1,32
310 Q=Q+1
320 IF PEEK(Q+1) = 86 THEN 750
345 POKE36877,0
350 NEXTI
500 PRINT"          "
510 PRINT"          "
520 PRINT"          "
530 PRINT"          "
540 PRINT"          "
550 PRINT"          "
560 PRINT"       0"
570 PRINT"  | |/ /"
580 PRINT"  | |/ /"
590 PRINT"  |/ /  "
600 PRINT"  |  /  "
```



```
610 PRINT"          "
620 PRINT"          "
630 PRINT"  | | ||  "
640 PRINT"  | |||  "
650 PRINT"  | |||  "
660 PRINT"  |   |  "
670 PRINT"  |   |  "
680 PRINT"  |   |  "
690 PRINT"  |   |  "
700 PRINT"  | |    "
710 FORH=1TO2000 NEXT
720 GOTO40
750 PRINT"GOT IT!!"
756 POKE36877 0
760 FORL=1TO1000 NEXTL
770 GOTO30
```

**Shoot Out**
*by Ian Fielder*



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## Cavern Runner

### on Vic20

The idea of the game is to dodge the meteors as you travel down the cavern. You have 25 missiles in case of an emergency. Use them carefully. As a last resort there is a hyperspace function to get you out of trouble. Controls are:

Z = Left
C = Right  Or use a joystick, down for
M = Fire  hyperspace
Space = Hyperspace

The game consists of two routines, the game and the death section. Each one calls the other routines as it needs them.

The game includes music and hi-score table.

**Program notes**

| | |
|---|---|
| 10-58 | Sets up User Defined Graphics |
| 65-68 | Tune |
| 88-119 | Instructions |
| 154-230 | Main loop |
| 800-910 | Death routine and another game |
| 1000-55020 | Various routines |

PROGRAM OF THE WEEK

```
0 POKE788,194 HI=100 PRINTCHR$(8) PRINT"J"
  CHR$(142) O=6186
1 DIMP$(6) FORA=1TO8 P$(A)=" 100 *VIC-20*
  NEXTA COL$="
3 POKE36879,25 PRINT" POKE36878,15
4 FORQW=0TO21 POKE7680+QW,160 POKE8164+QW,
  160 POKE38400+QW,(QWAND7)
5 POKE38884+QW,(QWAND7) NEXTQW
7 PRINT"    CAVERN  RUNNER"
10 PRINT"     ------  ------" PRINT"
  (VIC +3K  RAM)"
12 PRINT"    BY  R.HAMPTON"
13 PRINT"    ----------"
15 PRINT"  DEFINING  CHARACTERS"
16 PRINT" "SPC(5)"PLEASE  WAIT" PRINTSPC
  (5) ------------"
20 POKE51 255 POKE52 27 POKE55.255
  POKE56,27
25 FORI=0TO511
30 POKE7168+I,PEEK(32768+I) NEXTI
35 FORI=0TO(5*8-1) READA
40 POKE7168+I+(35*8) A NEXTI
50 DATA60,66,157,161,161 157,66,60,56,126,
  255 126,254,240,60,8
55 DATA66,102 126,126,90,102 60,24 16,56
  108 68,100,108 124,124
56 DATA0 0,255 255 255 255,255,255
59 POKE36869,255 GOSUB51000
60 GOSUB50000 POKE192,0
61 POKE36879,138 PRINT"J" PRINT"
  JOYSTICK(J)                  KEYBOARD(K
62 GETJK$ IFJK$="" THEN62
63 IFJK$="J"THENKJ=0 GOTO66
64 IFJK$="K"THENKJ=1 GOTO66
65 GOTO62
66 FORMU=1TO14 READNN TT POKE36876,NN FOR
  GG=1TOTT NEXTGG POKE36876,0 NEXTMU POKE
  36876 0
67 DATA195,100,187,50,183 100,195,100,195,
  100 195,100,201,100 195,200,187,100,..
  3,100
68 DATA195 100,209,150,215,50,219,255
69 POKE36865 160
70 PRINT"J    CAVERN  RUNNER "CHR$(35)
75 PRINT"     ------  ------"
80 PRINT" DODGE THE METEORS AS"
90 PRINT"  YOU DIVE  DOWN THE" PRINT""
  SPC(3) CAVE."
100 PRINT" YOU GET MORE  POINTS"
105 PRINT"THE FURTHER YOU TRAVEL ,
110 PRINT"   BUT YOU  HAVE 25"
115 PRINT"MISSILES IN CASE OF AN
  EMERGENCY."
119 GOSUB1000
120 IFKJ=0THENGOSUB9500
121 IFKJ=1THENGOSUB9750
131 PRINT"J    CONTROLS " PRINT"
  ---------
132 IFKJ=0THENGOSUB20000
133 IFKJ=1THENGOSUB10500
135 IFKJ=0THENGOSUB9500
136 IFKJ=1THENGOSUB9750
140 POKE36879,8 SC=0 PRINT "
150 PRINT"J                        " CE=7933
154 QX$=MID$(COL$,INT(RND(1)*5+1),1)
160 AS=INT(RND(1)*22+1) PRINTTAB(A
  QX$CHR$(36)
170 IFPEEK(CE)=36THEN800
180 POKECE 37
190 IFKJ=0THENGOSUB10000
200 IFKJ=1THENGOSUB30000
201 POKE36877,QD POKE36877 0
226 POKECE 32
227 SC=SC+1
230 GOTO154
800 GOSUB6000 GOSUB55000 POKE36879
802 PRINT"J   YOU CRASHED  INTO A
        METEOR."
803 GOSUB7000
805 PRINT"     YOU SCORED -" SC
806 IFSC>HITHENHI=SC
807 PRINT"     HI SCORE -" HI
810 GOSUB6000 POKE198 0
820 FORA=1TO20 POKE8120+A 36 FORD=1TO100
  NEXTD POKE8120+A,32 NEXTA
821 FORD=1TO1000 NEXTD PRINT"J
  POKE36869 240
824 S$=STR$(SC) POKE198,0
825 R=0 FORI=1TO8 IFSC>VAL(LEFT$(P$(I) 6))
  THENR=I I=8
830 NEXT IFR=0THENFORT=1TO500 NEXTT GOTO875
840 PRINT"JYOU ARE ONE OF THE TOP
  8 PLAYERS."
850 PRINT"  ENTER YOUR NAME" POKE19,1
  INPUT"      ,I$ POKE19,0 IFLEN(I$)>
  10THEN840
860 FORI=7TORSTEP-1 P$(I+1)=P$(I) NEXT
870 P$(R)=S$+" "+I$
875 PRINT"J"SPC(5)"HALL OF FAME
  PRINTSPC(5)"---- -- ----"
880 FORI=1TO6 PRINT "I,"  ",P$(I) NEXTI
890 IFKJ=0THENGOSUB9500
891 IFKJ=1THENGOSUB9750
895 POKE36869,255
896 POKE198,0
905 V=0
910 GOTO140
1000 FORA=160TO08STEP-.1 POKE36865
  A NEXTA RETURN
2000 POKECE,32 CE=CE-1 RETURN
3000 POKECE,32 CE=CE+1 RETURN
4000 POKECE,32 POKE36879 9 POKE366 6,
  200 FORZ=1TO500 NEXTZ
4010 RD=INT(RND(1)*21+1)
4015 POKE36879,8 POKE7922+RD 37
  CE=RD+7922 POKE36876 0 RETURN
5000 IFV=25THENRETURN
5004 FORFI=1TO7 POKECE+22*FI,?1 GOSUB9000
5006 IFPEEK(CE+22*FI+22)=36THENPOKE36874,
  204 FORHE=1TO5 NEXTHE SC=SC+2
  POKE36874,0
5010 POKECE+22*FI 32 NEXTFI
5020 V=V+1 RETURN
6000 FORDM=1TO11 READW EE
6010 POKE36875,W FORS=1TOEE NEXTS
6020 POKE36875,0
6030 NEXTDM
6040 DATA135,500,135,400,135,10 1 5 400
```

Continued on page 53

```
     151 200,143 200,143,200 136,200,135,200
     130
6050 DATA105 135,425
6055 RESTORE
6056 FORU=1TO68 READF NEXT
6060 RETURN
7000 FORA=7680TO7680+21 POKEA,39 POKEA+
     30720,3 NEXTA
7002 FORA=8164TO8164+21 POKEA 39 POKEA+
     30720,3 NEXTA
7004 FORA=7680TO8164STEP22 POKEA 39 POKEA+
     30720 3 NEXTA
7006 FORA=7701TO8185STEP22 POKEA 39 POKEA+
     30720 3 NEXTA
7008 RETURN
8000 POKE36879,26 POKECE 38 POKECE+30720,0
8003 Z1=36664 Z2=36665 FORZ3=1TO50 Z4=INT
     (RND(1)*2+10) Z5=INT(RND(1)*2+32)
8005 POKEZ2,Z5 POKEZ1,Z4 POKE36877 220
8010 FORZ8=1TO25 NEXTZ8 Z3 POKEZ1,12
     POKEZ2,15 POKE36877 0 RETURN
9000 FORM=200TO203 POKE36876 M NEXTM
     POKE36876 0
9002 RETURN
9500 PRINT"■■"SPC(6)"PRESS FIRE"
     POKE37154 0 POKE37154,127
9502 IF(PEEK(37137)AND32)=0THEN9502
9504 RETURN
9750 PRINT"■■"SPC(7)"PRESS F7
9751 POKE198 0
9752 IFPEEK(197)<>63THEN9752
9754 RETURN
10000 K=PEEK(37137) Q=PEEK(37152)
10010 IF(YAND16)=0THENGOSUB2000
10020 IF(QAND128)=0THENGOSUB3000
10030 IF(KAND8)=0THENGOSUB4000
10040 IF(KAND32)=0THENGOSUB5000
10050 RETURN
10500 PRINT"■■■Z-LEFT" PRINT"■■■C-RIGHT"
     PRINT"■■■M-FIRE" PRINT"■■■SPC-HYPER
     SPACE"
10510 RETURN
20000 PRINT"■■■■■USE JOYSTICK"
     PRINT"■DOWN-HYPERSPACE" RETURN
30000 OO=PEEK(197)
30010 IFOO=33THENGOSUB2000
30020 IFOO=34THENGOSUB3000
30030 IFOO=32THENGOSUB4000
30040 IFOO=36THENGOSUB5000
30050 RETURN
50000 PRINT"■■" POKE36879 42 POKE198 0
50010 PRINT"■■■■SPACESHIP SOUND" PRINT"
     ■■■■■■■■(Y/N)"
50020 GETNN$ IFNN$=""THEN50020
50030 IFNN$="Y"THENQD=255 GOTO50060
50040 IFNN$="N"THENQD=0 GOTO50060
50050 GOTO50020
50060 RETURN
51000 PRINT"■"
51002 FORXC=1TO100 UP=INT(RND(1)*506) UL=
     INT(RND(1)*7) POKE7680+UP,209
     POKE38400+UP UL
51003 POKE36876,INT(RND(1)*128+128) NEXTXC
     POKE36876,0 POKE36879,77
51004 FORIY=1TO3
51005 FORPI=0TO22 POKE36864,12+PI
     POKE36865,38+PI POKE36866,150-PI
     POKE36867,174-PI*2
51010 POKE36876,220+PI NEXTPI
51020 FORPI=22TO0STEP-1 POKE36864,12+PI
     POKE36865,38+PI POKE36866,150-PI
51025 POKE36867,174-PI*2
51030 POKE36876 220+PI NEXTPI,IY POKE36876 0
51040 PRINT"■■" RETURN
55000 FORXA=22TO0STEP-1 POKE36866 XAOR128
     POKE36867,XA*2OR128 POKE36876,220+XA N
     EXTXA
55010 FORXA=1TO22 POKE36866 XAOR128 POKE
     36867 (XA+1)*2OR128 POKE36876,220+
     XA NEXTXA
55020 POKE36876,0 FORJ9=1TO400 NEXTJ9 RETURN
```

**Cavern Runner**
*by Andrew Hampton*

## Patterns

on BBC

The program produces a pattern on the screen and makes sound effects while doing this. It will run on both BBC machines without any modifications

**Program notes**

| | |
|---|---|
| 10-60 | Attributes |
| 80 | Change to mode 2 |
| 90-150 | First section |
| 160-280 | Second section |

```
10REM ****************
20REM *** PATTERNS ***
30REM ***    BY    ***
40REM ***  COLIN   ***
50REM ***  PRYKE   ***
55REM *** AGED 14  ***
60REM ****************
70CC=1
80MODE2
90FOR A=1 TO 1200
100SOUND0,-15,A/2,1
110GCOL0,CC
120MOVE640,512
130DRAWA,1024
140MOVE640,512
150DRAWA,0
160CC=CC+1
170IF CC=8 CC=1
180NEXT
190FOR A=1 TO 1024
200SOUND1,-15,A/3,1
210GCOL0,CC
220MOVE640,512
230DRAW0,A
240MOVE640,512
250DRAW1280,A
260CC=CC+1
270IF CC=8 CC=1
280NEXT
```

**Patterns**
*by Colin Pryke*

# Murder at the Manor

gentime

Death comes to a quiet country village when the Lord of the Manor is savagely murdered.

The police are baffled and no reliable clues to help them.

Your skills as an ace investigator are required to identify and apprehend the murderer. This will involve searching for clues (which could be dangerous requiring ingenious adventurers) examining the bound of the event and asking questions of the right people.

What is the mystery of the Gravediggers Hut?

What secret does the code hold?

What lurks at the bottom of the brook?

These may be some of the questions you will ask yourself during your investigation into the murder at the manor.

The game is based on a real map comprising the secret rooms, the Garden, the Town, the Graveyard and many other fully described locations, inhabited by a variety of individual characters whom you are likely to meet.

It is up to you to solve the murder, the secret may reveal the answer — but will they tell YOU!

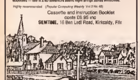
This original adventure for your 48K Spectrum and over 130 locations, all of which are presented in full colour machine-coded graphics.

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Highly recommended (*Popular Computing Weekly* Vol 2 No 42)

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**PUB CRAWL** £6 95

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A brilliant two part game. Part one is an arcade standard lander which trains you for part two. Here you must rescue lunar engineers in a perilous search! Fuel, dump landings and falling obstacles add to the perils of your heroic mission in one of the best Dragon programs available!

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A challenging and well-written game — *Dragon User*

Very good — *Dragon Data*

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## Close The Box

### on Dragon 32

This program is based on the old board game for two or more players. Each player throws dice and covers the numbers indicated by the dice. He continues until no further moves are possible. The board is cleared and play passes to the next player. Any numbers remaining uncovered at the end of a player's turn are counted against him. More than 45 points and you have lost. This continues until only one player is left.

**Program notes**

| | |
|---|---|
| 80 | Sets up a string of green for blanking out words etc |
| 90-170 | Ascertain the number of players and their names |
| 240-310 | Set up board numbers |
| 320 | Prints the score |
| 400-420 | Set up colour strings for the board |
| 430-510 | Draw the board |
| 520 | Holds the input prompt at the bottom left of the screen. |
| 360-800 | Enter players choice and prevent inadvertent entering of wrong numbers |
| 840 | Checks for a winner |
| 910-940 | Roll die 1 |
| 970-1020 | Print die 1 numbers |
| 1030 | Checks for board score of six or less and deletes right die if required |
| 1040-1080 | Roll die 2 |
| 1110-1180 | Print die 2 numbers. |
| 1200-1280 | Instructions |
| 1290-1350 | Keeps score and notifies losers and the winner |

The players overall score (in brackets) can be deleted by removing [ ( 45 − B + S(I) ) ] in line 320

```
10 CLS
20 PRINT@35, * CLOSE THE BOX *
30 PRINT@108, * FOR *
40 PRINT@165,'* DRAGON 32 *'
50 PRINT@232, * J.D.BATEMAN *'
60 PRINT@233, * 4/10/83 *'
70 FOR D=1 TO 250 NEXT
80 C$=CHR$(143)+CHR$(143)+CHR$(143)+CHR$
(143)+CHR$(143)
90 CLS PRINT@224, HOW MANY PLATERS ARE T
HERE(PRESS NUMBER THEN ENTER)
100 INPUTX CLS
110 T=X
120 DIM N$(X)
130 FOR I=1 TO X CLS
140 PRINT@224, PLAYER',I, PLEASE INPUT Y
OUR NAME.
150 INPUTN$(I)
160 NEXTI
170 CLS
180 PRINT@106, INSTRUCTIONS? PRINT@139,
 PRESS Y/N'
190 INPUT Q$
200 IF Q$= Y  THEN GOSUB 1200
210 S(I)=0
220 FOR I=1 TO X PRINT@0,N$(I),'W=0 W1=0
 W2=0'W3=0'W4=0 W5=0 W6=0 W7=0'W8=0 B=0
CLS
230 IF S(I)>45 THEN GOTO 1310 ELSE GOSUB
840
240 PRINT@136, 1  PRINT@139,'2'
250 PRINT@142,'3
260 PRINT@232,'4'
270 PRINT@235, 5
280 PRINT@238, 6
290 PRINT@328, 7
300 PRINT@331, 8'
310 PRINT@334, 9
320 IF A<10 THEN B=A+B PRINT@448,'YOUR S
CORE IS ',45-B, ( ,45-B+S(I), )'
330 PRINT@151, PRESS
340 PRINT@181, REQUIRED
350 PRINT@213, NUMBERS'
360 PRINT@247,'THEN
370 PRINT@278, <ENTER>'
380 PRINT@310, OR (11)
390 PRINT@335, TO PASS PLAY
400 X$=CHR$(136)+CHR$(129)+CHR$(131)+CHR
$(130)+CHR$(129)+CHR$(131)+CHR$(130)+CHR
$(129)+CHR$(131)+CHR$(130)+CHR$(133)
410 Y$=CHR$(138)+CHR$(133)
420 Z$=CHR$(138)+CHR$(132)+CHR$(140)+CHR
$(136)+CHR$(132)+CHR$(140)+CHR$(136)+CHR
$(132)+CHR$(140)+CHR$(136)+CHR$(133)
430 PRINT@102,X$,
440 PRINT@134,Y$;'PRINT@137,Y$, PRINT@14
0,Y$, PRINT@143,Y$,
450 PRINT@166,Z$,
460 PRINT@198,X$,
470 PRINT@230,Y$, PRINT@233,Y$, PRINT@23
6,Y$, PRINT@239,Y$,
480 PRINT@262,Z$,
490 PRINT@294,X$,
500 PRINT@326,Y$, PRINT@329,Y$, PRINT@33
2,Y$, PRINT@335,Y$,
510 PRINT@358,Z$
520 PRINT@96,CHR$(143), PRINT@128,CHR$(1
43), PRINT@160,CHR$(143), PRINT@192,CHR$
(143), PRINT@224,CHR$(143), PRINT@256,CH
R$(143), PRINT@288,CHR$(143), PRINT@320,
CHR$(143), PRINT@352,CHR$(143), PRINT@38
4,CHR$(143),
530 INPUT A
540 IF A=D1 OR A=D2 THEN L=L+1
550 IF A=D1+D2 THEN L=L+2
560 IF L>2 THENA=0
570 IF A=W THEN 810
580 IF A=W1 THEN 810
590 IF A=W2 THEN 810
600 IF A=W3 THEN 810
610 IF A=W4 THEN 810
620 IF A=W5 THEN 810
630 IF A=W6 THEN 810
640 IF A=W7 THEN 810
650 IF A=W8 THEN 810
660 IF A=0 THEN  820
670 IF A=11 GOTO 1250
680 SOUND55,5
690 IF A=D1 THENPRINT@19,C$, PRINT@51,C$
, PRINT@83,C$,
700 IF A=D2 THENPRINT@25,C$, PRINT@58,C$
  PRINT@89,C$;
710 IF A=D1+D2 THENPRINT@19,C$, PRINT@25
,C$, PRINT@51,C$, PRINT@58,C$, PRINT@83,
C$, PRINT@89,C$,
720 IF A=1THENW=1  PRINT@136,CHR$(128),
GOTO320
730 IF A=2 THENW1=2  PRINT@139,CHR$(128)
  GOTO 320
740 IF A=3 THENW2=3 PRINT@142,CHR$(128),
 GOTO320
750 IF A=4 THENW3=4 PRINT@232,CHR$(128),
 GOTO320
760 IF A=5 THEN W4=5.PRINT@235,CHR$(128)
```

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```
 GOTO320
770 IF A=6 THEN W5=6 PRINT@238,CHR$(128)
 GOTO320
780 IF A=7 THENW6=7 PRINT@328,CHR$(128),
 GOTO320
790 IF A=8 THENW7=8 PRINT@331,CHR$(128),
 GOTO320
800 IF A=9 THENW8=9 PRINT@334,CHR$(128),
 GOTO320
810 SOUND1,5
820   GOSUB  840
830 GOTO520
840 IF T=1 THEN1340 ELSEPRINT@0,N$(1),
PRESS P
850 PRINT@85,CHR$(143):PRINT@87,CHR$(143
).PRINT@90,CHR$(143):PRINT@92,CHR$(143),
860 PRINT@32,'FOR YOUR DICE'
870 P$=INKEY$ IF P$=  GOTO 870
880 IF P$<>'P' THEN SOUND 77,7 GOTO 840
890 FOR J=1 TO 20
900 L=0
910 PRINT@21, *' PRINT@23,'*  PRINT@21,C
HR$(143) PRINT@23,CHR$(143)
920 PRINT@54,'*' PRINT@54,CNR$(143]
930 PRINT@85,'*' PRINT@87, *  PRINT@85,C
HR$(143) PRINT@87,CHR$(143)
940 NEXT
950 D1=RND(6)
960 PRINT@50,D1
970 IF D1=1 THENPRINT@54,'*
980 IF D1=2 THENPRINT@21, *' ; PRINT@87,'
*
990 IF D1=3 THENPRINT@21, * ; PRINT@54,'
* 'PRINT@87,'*'
1000 IF D1=4 THEN PRINT@21, *' , PRINT@23
, * ; PRINT@85, *' PRINT@87, *'
1010 IF D1=5 THENPRINT@21, *' ; PRINT@23,
 * ; PRINT@54, *' PRINT@85, *' PRINT@87,
 *'
1020 IF D1=6 THENPRINT@21, * , PRINT@23,
 * ; PRINT@53,'* 'PRINT@55, *' PRINT@85,
 *  PRINT@87,'*
1030 IF8>38 GOTO 1170
1040 FOR J=1 TO 30
1050 PRINT@59,'*  PRINT@59,CNR$(143]
1060 PRINT@26,'*  PRINT@28, *  PRINT@26,
CHR$(143) PRINT@28,CHR$(143)
1070 PRINT@90, *' PRINT@92,'*' PRINT@90,
CHR$(143) PRINT@92,CHR$(143)
1080 NEXT
1090 D2=RND(6)
1100 PRINT@61,D2,
1110 IF D2=1 THEN PRINT@59,'*' ,
1120 IF D2=2 THEN PRINT@26, *  PRINT@92,
 *'
1130 IF D2=3 THEN PRINT@26,'*' PRINT@59,
 * , PRINT@92,'*'
1140 IF D2=4 THEN PRINT@26, *' PRINT@28,
 * PRINT@90, *' PRINT@92, *
1150 IF D2=5 THEN PRINT@26, *  PRINT@28,
 * PRINT@55, *' , PRINT@90, *' PRINT@92,
 *
1160 IF D2=6 THEN PRINT@26, *' PRINT@28,
 *  PRINT@58,'*' ; PRINT@60, * , PRINT@90
, *' PRINT@92,'*'
1170 FOR G=0 TO 18 PRINT@G,CHR$(143), NE
XT
1180 FOR G=32 TO 44 PRINT@G,CHR$(143), N
EXT
1190 RETURN
1200 CLS PRINT@9,'close the box'
1210 PRINT@65, THE PLAYER IN PLAY PRESSE
S <P> TO CAST THE DICE,AND THEN USES  TH
E SCORE TO COVER THE NUMBERS  (CLOSE THE
 BOXES).WITH A THROW  OF 5'4 FOR EXAMPLE
,HE CAN COVER  9  (THE AGGREGATE) OR USE
 EACH ONE SEPARATELY TO COVER 5 AND 4
1220 PRINT@289, THE PLAYER PRESSES <ENTE
R> THENPRESSES <P> FOR THE NEXT CAST OFT
NE DICE.
1230 PRINT@385,"AGAIN HE HAS THE CHOICE
OF THE AGGREGATE OR ONE OR BOTH NUMBERSU
SED SEPARATELY TO CLOSE BOXES.
1240 FOR J=1 TO 28000 NEXT'CLS
1250 PRINT@9,'close the box' 'PRINT@65, H
E CONTINUES IN THIS FASHION    UNTIL HE
IS UNABLE TO CLOSE AT LEAST ONE BOX HE M
UST THEN INPUT11 HIS SCORE IS RECORDED A
ND THEBOARD IS CLEARED.THE DICE ARE   PA
SSED TO THE NEXT PLAYER.'
1260 PRINT@257,'WHEN A PLAYER ACCUMALATE
S MORE THAN 45 POINTS HE DROPS OUT OF  T
HE GAME.  FOR J=1 TO 19000 NEXT CLS PRIN
T@3,'close the box'
1270  PRINT@65,'IF THE AGGREGATE OF THE
NUMBERSLEFT ON THE BOARD IS SIX OR LESST
HE RIGHT DIE IS DISCARDED.PLAY IS CONTIN
UED UNTIL ALL THE BOXESARE CLOSED OR A S
CORE IS GIVEN  WHICH CANNOT BE USED THE
PLAYER ENDS HIS TURN BY INPUTTING 11.
1280 PRINT@320, THE LAST PLAYER LEFT IN
THE GAME          IS THE WINNER.' FOR J=0
TO 15000 NEXT.RETURN
1290 CLS S(1)=S(1)+45 B 'IF S(1)>45 GOTO
1330
1300 PRINT@99,N$(1);  YOUR SCORE IS',S(1
) FOR D=0 TO 1500 NEXT IF S(1)>40 THEN F
OR J=0 TO 25 PRINT@235,'BE CAREFUL' FOR
F=0 TO 2 PRINT@235,C$+C$+C$.NEXT F SOUND
100,1 NEXTJ
1310 ' <C> J.D.B. 4/10/83 <C>
1320 NEXT I CLS GOTO 210
1330 T=T-1:PLAY O1L7GFEDC' PRINT@99,N$(1
),  YOUR SCORE IS';S(1) PRINT@204, you'r
e out'.FOR J=0 TO 2500 NEXT J CLS GOTO 1
310
1340 CLS PRINT@235,N$(1)
1350 PRINT@327,'you are the winner.  PLA
Y'O4L8CEGL405CO4L8GL405C'
1360 PRINT@448, PRESS BREAK THEN TYPE RU
N TO TRY AGAIN
1370 GOTO1370
```

**Close The Box**
*by J Bateman*


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## Quasimodo

### on Vic20

This program uses ugd, colour and sound Move Quasimodo across the screen to ring the bell without being killed by the fireball You have a time limit and points awarded by how far inside the limit you are

Once you complete a screen you get a new sheet which is faster The abbreviation ? should be used in the print statements at the end of the program

**Variables**

| | |
|---|---|
| Y | Your position |
| X – | Fireball's position |
| SC – | Score. |
| HI – | Hi score |
| Tm – | Time |
| L,L$ – | Lives left |
| F – | Extra life |

**Program notes**

| | |
|---|---|
| 1-9 | Sets up user defined graphics |
| 11 30 | Set screen layout |
| 40-60 | Move fireball and print score |
| 70 140 | Move Quasimodo |
| 300 350 | Cleared screen |
| 400-440 | Dead |
| 500 580 | End of game |
| 1000 1100 | Title screen (my highest score is 12 390) |

```
0 GOTO999
1 POKE51 255 POKE52,27 POKE55,255 POKE56,
  27 POKE36869,255
2 FORJ=0TO511 X=PEEK(32768+J) POKE7168+J,
  X NEXT
3 FORJ=0TO71 READX POKE7432+J,X NEXT
4 DATA24.24,60 90 153,36.34,33,42.92,234,
  255,103,246,90,44
5 DATA127 127,127,127,127,127,127,0
6 DATA254,254 254,254,254,254.254,0.1,1,
  1,1,1,1,1,1
7 DATA1,1,1,1,3,3,3,7,128,128,128 128,192
  ,64,64,160
8 DATA7 15,31,63,63,126,16,15,160,208.232
  ,240,240,126,0,240
9 POKE36879 8 POKE36878.15 N=0.T=200 Y=70
  34 X=7854 L=3 TM=990  M=2
10 F=0 SC=0 G=0 L$="!!!!"
11 PRINT"J"
20 PRINTTAB(19) "M&'"
21 PRINTTAB(19),"MK)"
22 FORJ=1TO5 PRINTTAB(19) "#K" NEXT
30 PRINT  FORJ=1TO95  PRINT"##$#", NEXT P
   RINT"##J"
39 GOTO430
40 X=X-1 IFX<7035THENPOKE7035,32 X=7854
42 POKE7831 37
43 IFSC>=39600THENSC=0
44 PRINT"##HI=       ######"HI,TAB(11),"
       #########TM="TM
45 PRINT"#C=       ######"SC;TAB(11),"
       ######" RIGHT$(L$ L-1)
46 IFSC>HITHENHI=SC
50 POKEX,34 POKE X+30720,1 POKEX+1,32 POK
   E36876,220 POKE36876,0
55 IFPEEK(X-1)=33THEN400
60 FORJ=1TOT NEXT
66 TM=TM-30 IFTM<=0THEN400
68 G=G+1
69 IFG<MTHEN40
70 GETA$
80 IFA$="M"THENY=Y-1 POKE36876,200 POKEY+
   1,32
81 IFY=7834THENY=7835
   IFA$="M"THENY=Y+1 POKEY-1 32 POKE36876
   ,200
100 IFA$=" "ANDY>=7833THENY=Y-22 POKEY+22
    32 Q1=1 POKE36876,200
111 IFQ2=3THENQ2=0 Y=Y+22 POKE36876,200 P
    OKEY-22,32
115 IFQ2=2THENQ2=3
116 IFQ1=1THENQ1=0 Q2=2
120 POKEY,33 POKE36876,0
130 IFPEEK(Y+1 )=34THEN400
135 IFPEEK(7833+20)=33ORPEEK(7833+21)=33
    THEN300
140 GOTO40
300 N=N+1 T=T/1.4 SC=SC+TM
301 TM=990
302 FORC=1TO5
310 FORJ=128TO255STEP5
320 POKE36876,J NEXT NEXT
325 IFT<10THENT=30
330 IFN=>10THENM=M+1
332 POKE36876,0
333 IFM=>6THENM=6
340 IFSC>1500ANDF=0THENL=L+1 F=F+1
345 POKEY,37 POKEX,32 X=7053 Y=7835
350 GOTO40
400 FORJ=255TO128STEP-.4
410 POKE36874 J NEXT
420 POKE36874,0
425 L=L-1 IFL=0THEN500
430 N=0 T=200 TM=990 POKEX,32 POKEY,32 X=
    7053 Y=7835
440 GOTO40
500 REM END OF GAME
510 PRINT"J#####    SCORE="SC"#"
540 PRINT"##   AGAIN [Y/N]?"
550 GETW$ IFW$=""THEN550
560 IFW$="Y"THEN9
570 IFW$="N"THENEND
580 GOTO550
999 POKE36879,152
1000 PRINT"J#      QUASIMODO" PRINT"###
     BY GLENN ACKROYD" PRINT"#       1983"
1001 PRINT"## GUIDE QUOSIMODO TO    THE
     BELL BEFORE THE   TIME RUNS OUT"
1002 PRINT"# JUMP OVER THE FIRE-  BALLS!!"
1003 PRINT"# CONTROLS -"
1004 PRINT"# CRSR DOWN = LEFT" PRINT" CRSR
     LEFT = RIGHT" PRINT" SPACE BAR = JUMP
     "
1005 PRINT"# EXTRA LIFE AT 1500
1100 GOTO1
```

**Quasimodo**
*by Glenn Ackroyd*

# The best books for the Dragon 32

SUNSHINE



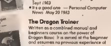
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## Alien Attack

### on Spectrum

The object of this game is to shoot the invader which is coming down to earth As your score gets higher he gets faster — the higher up the screen he is when you shoot him the more points you get If the invader should manage to reach earth, all his friends will join him and the game is over

**Program notes**

Lines
2-30 Sets the graphics
100 225 Main program
230 1000 Speed of invader
2000-2050 Fire
2500 2540 Alien death
3000-3060 Your death
9000 9550 User defined graphics

**Graphic notes**

120 = Graphic A, Inverse space, Graphic C, Graphic C
200 = Graphic E
220 = Graphic E
2030 = Graphic C
2510 = Graphic F
3020 = 32 Graphic E's
(Line 222 is simply 32 inverse spaces)

```
1 GO SUB 9000
2 LET sc=0  LET v=10  BORDER 0
  PAPER 0  INK 7
3 LET q=0
4 LET x=20  LET y=0
5 LET a=1  LET p=15
20 LET z=0  LET b=10
30 LET  =0
100 REM MAIN PROGRAM
110 LET y=y+(INKEY$="p" AND y<
30)-(INKEY$="o" AND y>1)
120 PRINT AT x,y; "   ";AT x-1,y
+1;" "
130 PRINT AT x,y-1;" ";AT x,y+3
;" ";AT x-1,y;" ";AT x-1,y+2;" "
132 IF z=0 THEN GO TO 145
135 LET z=x  LET c=y
140 IF INKEY$="0" THEN BEEP .1
,0  GO SUB 2000
145 IF q=0 THEN FOR a=1 TO 3
150 PRINT AT c,p;" "
160 LET d=INT (RND*6)
170 IF d=1 THEN LET e=e+1
180 IF d=2 OR d=4 THEN LET p=p+
1
190 IF d=3 OR d=5 THEN LET p=p-
1
195 IF p=30 THEN LET p=29
200 PRINT AT 0,P;" "
210 IF a=20 THEN GO TO 3000
215 IF q=5 THEN NEXT a
220 PRINT AT 0,0; INVERSE 1;"s
c";AT 0,10;"Score ";sc
222 PRINT AT 21,0; INK 4; BRIGH
T 1;"                                "
225 REM SPEED
230 IF sc>80 THEN LET v=7
240 IF sc>100 THEN LET v=5
250 IF sc>125 THEN LET v=3
260 IF sc>200 THEN LET q=5
1000 GO TO 100
2000 REM FIRE
2010 PRINT AT z,c;" "
2015 IF z=1 THEN PRINT AT z+1,c;
" " GO TO 100
2017 IF z=0 THEN RETURN
2020 LET z=z-1
2030 PRINT AT z,c+1;"c"
2040 IF z-a AND c=p-1 OR p=z AND
 p-1=c THEN GO TO 2500
2050 GO TO 2000
2500 REM ALIEN DEATH
2510 PRINT AT a,p; FLASH 1;"F";
FLASH 0
2520 BEEP .8,30  BEEP .5,40
2530 LET sc=sc+(20-a)
2535 PRINT AT a,p;" "
2540 GO TO 5
2990 REM YOUR DEATH
3000 PRINT AT a,p;"   " OR n=1 TO
 
3010 BEEP .5,0
3020 PRINT "EEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEE"
3030 NEXT n
3040 PRINT AT 10,10; FLASH 1;"Ga
me over";AT 12,0;"score ";sc
3050 IF INKEY$="" THEN GO TO 3050
8000 RUN
8999 REM USER DEFINED GRAPHICS
9000 RESTORE 9500
9010 FOR i=USR "a" TO USR "f"+7
9020 READ a  POKE i,a
9030 NEXT i
9040 RETURN
9500 DATA BIN 00000001,BIN 00003
011,BIN 00000111,BIN 00001111,BI
N 00011111,BIN 00111100,BIN 0111
1000,BIN 11110000
9510 DATA BIN 10000000,BIN 11000
000,BIN 11100000,BIN 11110000,BI
N 01111000,BIN 00111100,BIN 0001
1110,BIN 00001111
9520 DATA 0,0,BIN 00011000,BIN 0
0011000,BIN 00011000,BIN 00011000
,BIN 00011000,BIN 00011000
9530 DATA 0,0,BIN 10000000,BIN 1
0000000,BIN 10000000,BIN 10000000
,BIN 10000000,BIN 10000000
9540 DATA BIN 01111110,BIN 01011
010,BIN 01011010,BIN 01111110,B
IN 00011000,BIN 00100100,BIN 010
00010,BIN 10000001
9550 DATA BIN 10010011,BIN 11010
111,BIN 00111000,BIN 00111000,BI
N 00111000,BIN 01010100,BIN 1001
0010,BIN 10111001
```

**Alien Attack**
*by P Baillie*

## Microradio

**GW6JJN**

### Morse tutor

As promised here are some reviews of amateur radio software on the market The first tape is a morse code tutor written by two people with the name J E Price Their callsigns are *G40IK* and *G40IL* and the mail order address is 4 Housman Walk, Kidderminster, Worcs DY10 3XL the price of the tape for the 16 or 48K Spectrum is £4 50

The program by Messrs Price is a professional piece of software which is extremely suitable for learning morse code to the standard required by the examiner The program opens with some nice user defined graphics of morse keys hammering away The program is menu driven and by selecting the required speed and lesson, the computer patiently bleeps out morse code in groups of letters and/or figures

You can return to the menu at any time to change the lesson and each time this happens there is a pleasing screen clear routine A morse tutor is not a very sophisticated problem for a computer so the routines that are added to this program give it a nice touch of professionalism that makes the tutor value for money

The second tape received was from *G4RWT* Amateur Radio Software 68 Forest Road Paddock Wood Tonbridge Kent TN12 6JX The price is £4 50 (cheques to R M Walton) This tape consists of a morse tutor for the 16K Spectrum, a morse tutor for the 48K Spectrum and a program called *Sattrack*, also for the Spectrum *Sattrack* is, of course, a satellite tracking program

The first impression is that this tape is good value, two for the price of one, and this impression is confirmed by use The morse tutor is also a good piece of software, professionally executed and perfectly adequate for learning the code Again graphics are used and there are instruction sheets that help in understanding the program

The accompanying sheets also contain an interface diagram, which will help you to interface the Spectrum to the transceiver in order to send morse code from within the program One of the menu selections is a morse keyboard, which enables you to send morse simply by pressing the relevant key on your micro

The *Sattrack* program also has instructions about its use This program will enable you to track any amateur satellite given its orbital data (available from AMSAT) Data is built into the program, but this may need updating from time to time Since the going rate for a computer program on tape these days is about a fiver, then you must consider this good value Both the tutor and the *Sattrack* program do what is required of them and both are user friendly in that the user is prompted for input and the instructions are clear

If there are any other producers of radio software out there then please let me know — there is far too little radio software about as it is for it to go unsung ■

**Ray Berry GW6 JJN**

This series of articles is designed for radio and microcomputer enthusiasts alike If you have any queries that you want answered hints and tips to share or topics that you would like to see covered write to Ray Berry, Microradio *Popular Computing Weekly*, 12 13 Little Newport Street London WC2H 3LD

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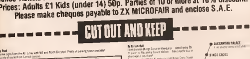


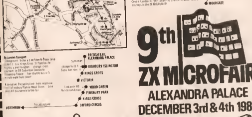
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## Tony Bridge's Adventure Corner

## Dragon advice

*Knight's Quest* from Phipps Associates (which I first looked at in issue 42) seems to be holding the attention of a lot of people at the moment. Playing this for the few moments that I could spare when it first arrived, I thought — yes, a nice traditional adventure, which will pass a few hours. But recently, I have come to look upon it as very much more complex than I had originally thought. And so, it appears, do several of our regular readers.

Geoffrey Larsen of Clifton in Bristol, for example, reckons that *Knight's Quest* "becomes increasingly more addictive and difficult as you progress, and I preferred it to *The Hobbit*" — high praise indeed! Susan Schoen, of Cardiff, also enjoyed playing KQ, and sent me an account of her game, written entirely from memory, as her Spectrum had surrendered after giving sterling service for the duration! Thanks to both of you for a lot of very helpful advice, and thanks to Phipps, who have very kindly sent me some welcome hints to help me answer your queries.

A few weeks ago I gave you the wrong advice to help you deal with the Dragon — at that time I said you would eventually need to kill the Dragon, so that you would be able to cross over the river in the ferry. Well, although the Dragon is too heavy to come in the ferry with you, and you will have to cross the river, don't kill the Dragon! I'm afraid that reviewer's short-sightedness overcame me, and I didn't realise that the adventurer would need the Dragon at a later stage (thus going against my own Golden Rule of Adventuring: *Everything has a purpose*!).

The Dragon will be extremely useful to you later in the Adventure, and in his cave you may find something just as useful (although this will take a bit of lateral thinking, and is not an easy problem to crack). This is only the very start of the Adventure — you'll find a lot more to keep you happy. As Geoffrey Larsen says, "There are many more problems in this game than *The Hobbit*!"

*Knight's Quest* is an Adventure that will keep you happily frustrated for many a long hour, and is one that I can recommend without hesitation. Incidentally, Geoffrey, if you are still having problems in *Colossal Adventure* from Level 9, all I can say is that you are on the right track with the magic words — but you need to say them directly after climbing the beanstalk (remember the fairy story!). Have you found the Emerald yet? Once you have found the treasure that you are seeking, you must use another magic word to deposit the treasure in the building.

From one Dragon to another — I've already had an update from Dungeon Software of their latest large release of Adventure programs. The first of the programs is *Return of the Klarz*, the sequel to *Crystal Chalice*, which I mentioned a couple of weeks ago. Then comes *Dream Machine*, which is programmer Mike Meineck's "answer to *Pimania*", and finally *Back Lot*, which is "an Adventure set after hours on the back lot of a Hollywood film studio".

Mike, feeling that he is not worked hard enough doing all this, is now adding Commodore 64 graphics to the whole range. I haven't actually seen any of these Adventures yet, but apparently many of you have invested in them and are already, says Peter Woods, the Dungeon master, ringing in with pleas for help with dealing with the piranhas in the Black Lake in *Crystal Chalice*.

His advice, which he would like me to pass on to anyone struggling with the problem, is to study how the Brazilian Indians deal with them when crossing rivers!

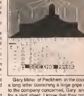
Sticking with the Dragon, and new releases, Salamander Software have just let loose *Lost in Space* on an unsuspecting world. The subject of this, the second in the Dan Diamond trilogy, concerns the sub-Mike Hammer private eye getting stuck on a derelict spaceship (from Sunset Strip to a trip into the Sun!). The ship is filled with chatty doors (believe me!) and bored robots. The object is to escape, and this you must do by finding your way to the bridge and taking control of the ship.

The display is the same as in Part One, *Franklin's Tomb*. Top left is a description of the current location, and anything that you may be able to see. On the right of the screen is an inventory list, which is visible throughout the game, while the bottom third of the screen contains all your command input and the computer's responses. As well as the usual kind of objects found in this type of Adventure, you will also come across several coloured discs, for which you will find special uses (so I'm reliably informed!).

The program recognises a vocabulary of about 50 verbs and 80 nouns — but watch out for Red Herrings and Blue Kippers!

Following the example set by *Franklin's Tomb*, a manual is included in the package, graced by 13 pages of beautifully-drawn pictures of the locations (and these may contain vital clues).

The video style cases that contain the Adventures seem to be getting bigger with each one — are Dan's cases also getting bigger? Anyway, *Fishy Business* is the third part of the trilogy, and I can't wait!



Gary Miller of Peckham, in the course of a long letter containing a large gripe (write to the company concerned, Gary, and ask for a Hint sheet. I know that they produce one, and may, indeed, give help on a specific point if you ask), mentions the good old *Hobbit* problem, the Goblin's Dungeon!

This has been covered very well in previous corners, Gary, and I'm not going over it again, but if you are still stuck, and for the benefit of newcomers to *The Hobbit* (and if you are the proud owner of a BBC, Commodore, or Oric, then this program must be added to your collection — ask your favourite aunt to make it a Christmas pressy for you!), then turn to the Adventure Corner in *PCW* 21-27 July, where some, if not all, should be revealed.

Gary reckons that *Sorcerer's Castle* from Mikrogen is one of the ultimate Adventures. He is an old Dungeons and Dragon fan, and obviously enjoys all the good old-fashioned monster bashing.

There are one or two more programs around that borrow from D&D, although a solo outing on a computer can only really be a rather pale imitation of the original. However, I like *Dungeon Master* from Crystal Computing, and you should find that it gives you a good flavour of D&D, with Charisma, Wisdom, Intelligence and all the other details such as Hit Points, lots of Magic Spells and plenty of potions all making an appearance.

Not only that, but *Dungeon Creator* on the same tape allows you to actually play Dungeon Master and map out and populate your own Dungeon in the privacy of your own home (see a more detailed look at the tape in Adventure Corner, *PCW* 22-28 September). An excellent pair of programs which should whet the appetite of the jaded D&Der. ■

This series of articles is designed for novice and experienced Adventurers alike. Each week Tony Bridge will be looking at different Adventures and advising you on some of the problems and pitfalls you can expect to encounter. So if you have an Adventure you want reviewed, or if you are stuck in an Adventure and cannot progress any further, write to Tony Bridge, Adventure Corner, *Popular Computing Weekly*, 12-13 Little Newport Street, London WC2R 3LD.



## IN COMMAND

*Michael J Lever of Lilliesfield Avenue, Barnwood Gloucester writes*

**Q I own two 48K Spectrums, one is an Issue 1, and the other is an Issue 2. I have discovered an interesting, (and annoying) difference, between the two of them. It concerns the *In* command**

**Normally the *In* command should return just one value, (255), if no key is pressed. I have used this feature in a number of games, written on my Issue 1 Spectrum. However I discovered that when I *Loaded* the games into my Issue 2, *In* returned a value of 191, and the games did not work properly.**

**Can you tell me how to remedy this bug, so that 255 is returned on my Issue 2 Spectrum?**

A To be fair to Sinclair, the specifications never suggested that *In* would always return 255 The way to get 255 returned is to make sure that 255 is there If you proceed the *In* with *Out* x 255 where x is the keyboard value you are checking then *In* will return a value equal to the *Out* value Unless of course that value is changed by pressing a key

## TAPE TO DISC

*David Cartwright of Bowshaw, Dronfield Sheffield writes*

**Q At the school I attend we have a computer room with 11 computers, three of which are connected to disc drives. I use the computer room quite a lot and we have recently acquired several discs for the disc drive machines.**

**However, I have found that the system for saving and loading machine code programs on tape does not work on the discs Could you please tell me how to put machine code programs on to disc and how to calculate the address.**

**I know how to transfer from tape to tape but nobody at school knows how to do this on a disc. When I looked it up in the manuals under *Save it just gave a lot of meaningless address letters, FFFF 5555 etc Even the teachers could not help Please can you help as I urgently need an answer?**

A A lot of people have been disappointed when, having bought discs, they find that they cannot easily transfer programs on tape to the disc Most of the problems stem from the fact that the disc operate by using 2 5K of user RAM Essentially what you'll have to do is relocate all the programs on tape so that they do not use any of the same space as the discs The cassette page is at *& E00* while the discs are at *& 1900* Any program using the space in between will find it already occupied

To explain in any detail how to move the programs would take an article that is beyond the scope of this page If you try the following * OPT 1 2 then *CAT and then *Run* the program At the end you will get the length load address, and execute address in that order This should be enough for you to relocate your program

## RAM PACK WOBBLE

*Eileen Morris of Beechwood Drive Woodford Green Essex writes*

**Q Can you offer some advice to a young at heart pensioner who has just bought herself a ZX81? I bought one of those packs that have the extra 16K RAM in it, and I was doing fine until I put the extra RAM on to play chess The screen displays the program but it waves all over the place. It's not the cassette recorder Any advice?**

A This letter firmly disproves the theory that every computer owner is a male under the age of 20 I hope I can solve your problem There are two likely causes One is that your television just needs re-tuning slightly All computers can wander off-channel sometimes, the ZX81 more than most Adding the RAM pack might help to de-tune it Because you actually get the program on the screen I think this is the most likely cause of your problems

The other cause could be something to do with the timing or the coding of the timing signal The problem should be in the RAM pack as the computer works well enough without it fitted Do you find that the pattern 'beats' or does it seem random? The easiest thing to check here is that the RAM pack is firmly attached to the computer RAM pack wobble is still a major cause of faults on the ZX81

If re-tuning the television doesn't work and you're sure the RAM pack is fixed tightly I'm afraid you'll just have to return the pack to the manufacturers

## FLAT ADAPTOR

*David Jones of Haol Cefn Ciermawr Morriston Swansea writes*

**Q Please can you help a down and out computer Junkie? Last week I trod the streets of Swansea looking for the six-pin flat adaptor for the Vic20 and the C2N cassette deck**

**The answer I got from all the computer and audio shops was that my only hope was to contact Commodore direct, and that it would otherwise be impossible to obtain I have now waited a week and a half but have had no reply from them Do you know where I might write, phone, or pray to get one?**

A What you need is a US standard edge connector The American standard is 0 15 and you should be able to find one with the right number of connections One place I know that does have them is Maplin Electronic Supplies, Unit A Oats Road South Hadleigh Benfleet, Essex SS7 2BB

## PASS WORDS

*Shane Gale of Alectus Way Witham, Essex writes*

**Q I am writing to ask you if, when you are dialling into another computer, you have to guess the pass words? Or is there a manual available that lists them? I already have access to the code numbers of six or seven large computers, but the missing piece of the puzzle is the code words. Can you help?**

A No, of course you don't have to guess the pass words, but the whole idea is that only the user knows them, and no one else Why have a pass word to protect a system, if a list of them were readily available? I can understand the excitement and sense of achievement that must come from breaking into a computer system However what people do not seem to realise is that apart from being theft it is also very dangerous especially if as has happened in the United States people try to break nuclear and military computers These people have now been caught by the FBI

Remember that the government does not know that your intentions are innocent — if caught you could find yourself being treated more like a terrorist Breaking generally, it's just likely to create problems in the long-run as companies spend more and more money preventing it It could for example mean that the computer checks the source of each call — a kind of phone tapping Would you want that?

**Is there anything about your computer you don't understand, and which everyone else seems to take for granted? Whatever your problem *Peek* it to Ian Beardsmore and every week he will *Poke* back as many answers as he can. The address is *Peek & Poke*, *PCW*, 12-13 Little Newport Street, London WC2R 3LD.**


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**DRAGON 32**. Five highly imaginative games on a quality cassette plus original documentation including Pucmann Invader Synthesiser Duel and Colony costing £3.50 inc p&p Cheques/PO to A. J Wass 19 Fernwood Marple Bridge SK6 5BE

**DRAGON GAMES** for sale 10 games all together at £50 or £5 50 each Pair of joysticks for £15 (everything in very good condition) games include many top rated by Salamander 061 797 8665

**DRAGON 32** Good condition guaranteed all leads new joysticks reliable recorder 4 Microdeal cassettes Berserk cartridges worth £270 offers over £180 Telephone Duloes 87411 after 6 pm

**DRAGON 32**. Still boxed 1 month old and new cassette recorder 1 pair joysticks all leads and manual 2 cassette games cost £225 bargain only £180 Tel Accrington 0254 381020

**DRAGON 32**. £40 of software manuals lead book and cassette player £130 Tel 0962 007960 after 6 pm

**DRAGON 32**. £400 software machine code cartridge 1 joystick 4 games sell £90 ono Barton 781147 Don Cambell

**DRAGON 32** + 3 cartridges joysticks cassette s w and books £180 Tel Fleet (Hants) 02514 20152

**DRAGON 32** + joysticks + dust cover + £150 top name software + 6 books £120 or swap for 48K Spectrum Issue 2 + software Tel East Grinstead 0342 27072

**DRAGON 32**, 3 months incl a pair of joysticks dust cover approx £50 2 cartridges £170 ono 021-328 5601

**DRAGON FOR SALE** £135 no offers with extras Tel 061 945 1269

**DRAGON 32**, manual joysticks leads plus £70+ of software including Ring of Darkness Katerpillar Planet Invasion plus £20+ of magazines worth over £350 sell for £200 ono Tel 0298 401623

**DRAGON 32**, cassette recorder over 25 tapes including Donkey King Katerpiller Attack Hi res cartridge 51 x 24 screen 2 joysticks light pen book magazines only £220 for quick sell Tel 01 703 7985

**DRAGON 32**, boxed, with all leads manuals etc book £30 worth software all Dragon User magazines, worth £220 sell £160 Ring 0704 68884

**DRAGON 32**, under guarantee boxed including all leads £30 worth of software 2 new joysticks and £20 worth of books and mags £150 Tel Leeds 604[illegible]1 after 5 pm

**DRAGON 32**, complete with 20 software tapes (Arcade Adventures Home Finance) three cartridges (inc Chess) books joystick printer cable and Dragon User magazines £210 ono Phone 01-841 2295 Johnson

**DRAGON 32**, very good condition 3 joysticks 3 books over £220 worth of s w cost £450 sell for £210 ono Tel (0279) 815623

## Ataris for sale

**ATARI VCS** [illegible] cartridges including Pacman Asteroids Space Invaders two joysticks and paddles £120 or exchange Vic20 + hardware and software Tel 0702 710248 ext 48 (day time)

**ATARI VCS** plus four cartridges including Space Invaders with joystick and paddles will sell for £75 ono (or will swap for Spectrum) Tel 051 220 0043

**ATARI VCS**, 10 cartridges excellent condition worth £400 Sell for £130 Tel 455 1042

**ATARI 400** 48K moving keyboard program recorder joystick all manuals PSU etc 50 machine code games include most famous titles and others! £270 ono Tel 01 594 6[illegible]

**ATARI 400** 48K with disc drive 810 inc Atari Basic Microsoft Basic Assembler Editor Monkey Wrench two arcade and adventure games + manuals Sell for £570 Tel 01 722 4570

**[illegible] ATARI VCS CARTRIDGES** between £8 and £10 inc Missile Command Asteroids Tel Bicester 242 408 (5–6 pm)

**ATARI VCS** + two paddles + two joysticks — games cartridges £50 01 [illegible] 7325

**ATARI VCS** plus Pacman and Defender with Combat, joysticks, all for £80 Tel Southend 710268 after 4 pm on weekdays

**ATARI VCS** and all the gear plus nine cartridges and a dust cover including Pacman Space Invaders Chopper Command and Asteroids worth over £250 bargain at £95 Tel Southend-on-Sea 232420

**ATARI VCS** with Space Invaders and Combat cartridge £90 Tel 01 675 0797

**ATARI VIDEO COMPUTER SYSTEM** plus six cartridges including Defender Asteroids and Space Invaders All boxed £100 or nearest offer or will sell games separately Tel Penrith (Cumbria) 80618

**ATARI 800** Basic Star Raiders two joysticks and over £15 worth of books only one month old Sell for £180 ono worth over £300 Tel 01-658 3735 evenings only

**ATARI VCS.** Good condition, five cartridges £60 ono Tel 01 328 2075

**ATARI VCS.** Paddles and joystick nine cartridges, Asteroids Space Invaders £150 Tel 01 452 4838

**ATARI 800** 48K tape recorder disk drive £300 of software as new would cost £950 accept £650 Tel 021-550 9824

**ATARI VCS** plus joysticks paddles combat cartridge and manuals excellent condition still guaranteed £60 Atari VCS tidy two cartridge holders and dustcover £7 Empire Strikes Back cartridge £17 Phoenix cartridge £17 The lot for £88 ono Tel Woking (04862) 70318

**ATARI 800 48K**, 410 program recorder £150 of games back-up cassette lost in boxes with one Atari and quickshot joystick. Offers or swap for BBC Tel 01 550 0105 after 4 pm or swap for BBC

**ATARI VIDEO COMPUTER SYSTEM** with three cartridges Combat, Street Racer and Space Invaders All boxed with full instructions Very good condition £75 ono Tel 0254 391335

## Wanted

**WANTED PRINTER** for BBC Phone Maldon [illegible]

**SWAP** Atari 400 plus 16K, Basic recorder manual and software for Spectrum 48K plus bits or sell for £130 As new Ideal for Christmas Tel Martin after 7 pm Burgh Heath 57278

**SPECTRUM SOFTWARE SWAP** 3D Tanx Arcadia Hobbit Flight Simulation Gulpman Jetpac Penetrator Centipede and many more Tel. 01 748 5728

**WANTED** Faulty or damaged ZX Spectrum 48K or 16K Tel Abingdon 834613 after 5 30 pm

**WANTED** 16K Spectrum Must be Model 1 plus PSU leads etc No software needed Tel Rugby (0788) 60405 Mr Shelley

**SWAP** Dragon 32 for BBC Model B including £200 of software Most popular titles, still under guarantee Mint condition Leads joystick, manuals included Tel 01-370 5886

**WANTED** ZX Spectrum 48K software printer if available Tel Chesham (0494) 772544

**SWAP OR SELL** Oric 1 48K cassette recorder joystick interface quickshot joystick £60 software printer voucher worth £300 Very good condition swap for Atari 800XL or sell for £200 ono Tel Melton Mowbray 80281

**SWAP ADVENTURELAND** cartridge for any other in Scott Adams C8 Tel (0698) 421 327 Hamilton

**SWAP SPECTRUM** for Dragon software Mostly interested in adventures would like Mysterious Adventure series but anything considered Tel 0382 833240

**AR ATARI 810** disc drive plus disk software Tel Dudley 53149 evenings

**WANTED BADLY** 16K/48K Spectrum with manuals will pay £70 to £80 plus postage costs Also wanted quality software Send offers to Jon Erik Sorge Box 42 3135 Torod Norway

**SWAP** Dragon 32 plus joysticks and software including Frogger Shuttle The King and more also Dragon User magazines Four months old boxed for 48K Spectrum with software (under guarantee)

**WANTED** Diagrams and technical information on TI99/4A add-ons Also secondhand RS232, modules cartridges etc Write T R Freeman 155 Albert Street, Fleet Hants GU13 9RP

## For sale

**SHARP MZ 80K** built in screen and tape recorder £350 of software and manuals user guides and program books and dust cover for £295 ono Tel 01-455 6841 Golders Green after 4 30 pm.

**LYNX 48K**, as new Still under guarantee Boxed with manuals leads demonstration tape and users magazines £150 Tel Wickford Essex, 66701

**PHILIPS G7000 VIDEOGAME**, 18 cartridges dustcover Good condition value £560 sell £170 or NU cartridges separate £8 50 each Quest for the Rings £18 Tel Accrington 0254 396847

**LYNX SOFTWARE GAMES PACK II**, plus IV Adventure Quest etc book plus two newsletters Any reasonable offer over £10 accepted Tel Egham 33502 (Surrey) Private sale Good condition

**FOR SALE OR SWAP** Spectrum 48K software Most well known titles, including Arcadia Flight Simulator etc. Tel Larg (Scotland) 0548 2113

**SELL VIDEOGENIC 16K** £250 worth of software books and manuals £200 ono Consider 49 Homefield Road, Pucklechurch Bristol BS17 3QA. Tel 027582-2145

**MICRO-PROFESSOR ONLY**, £80 Brand new only two months old Tel 01 361 2289 after 8 pm.

**LYNX 48K** six months old complete with compatible tape recorder nine games tapes associated books newsletters and listings Bargain at £175 Write to 31 Irwell Place Platt Bridge Near Wigan WN2 5EF

**ARCADIA**, 3D Tanx £2 Time-gate Battlezone £4 Hobbit £8 Flight Simulation £2 VU-3D £7 magazines and books 25p p&p Write to D Appleton 8 Cornwall Road High Bridge Somerset (Private sale)

**ZX PRINTER.** Original roll unfinished plus five rolls of paper improved spool and software to enable sideways print £25 Tel Bath 887155 during office hours

**WIRELESS WORLD MICRO PSI-COMP 80 Z80** + number cruncher board built by professional engineer from Rubus! + power tran kit, full paper work + news letters Offers? Tel 01 289 7219 (evenings)

**INTELLIVISION.** Boxed as new Unwanted gift Three free games Hardly used Bargain at £75 ono Tel Oswestry (0691) 658468

**CROMEMCO** high resolution colour graphics system Complete 760 X 580 Pixel system with graphics software New cost over £3 500 Offers around £2 000 Tel Aberdeen (0224) 572933

**TRS-80 MODEL 1** level 2 Basic 48K expansion interface one disc drive cassette lots of software including Scripsit Edtasm Zchess II Nendas 20 etc £400 ono Tel (07918) 8254

**DATA CASSETTE RECORDER CCR800** for Spectrum Oric etc Very reliable £18 Forth Manual Winfield compiled Forth book Hampson tape version 2 £4 Tel 0803 383212 or 0803 630248

**LYNX 48K MACHINE**, four months old hardly used mint condition manuals introductionary cassette books as new cost £225 sell for £180 ono Tel 01-626 1500 (office hours) extension 2017

**TI99/4A**, as new £75 Chess and personal records cartridges £20 each TI 8541 LCD programmable calculator £30 Chess Challenger 7 chess computer £35 20 Callanen Close Ashington Northumberland NE63 9QT

**INTELLIVISION GAME** plus six games £120 Tel 01-676 0095.

**OHIO SUPERBOARD** faulty books £40 or [illegible] 8088 development system with intel monitor eproms etc offers Hugh Bridge 583 Kennington Lane Vauxhall London SE11 5QY Tel 01 735 1462

**TEXAS INSTRUMENT PI99** home computer games module Basic Chess Munchman £20 ono Hardly used Tel 01 [illegible] 0767 (evenings)

**GEMINI GALAXY 2 800K DISK.** As new £200 Tel (0753) 882389

**SHARP MZ80K** plus printer £900 Tel (0753) 882389

**ASTRO CLASH** for the unexpanded Vic20 good sound effects and graphics for only £1 20 a copy inclusive of p&p Send to 38 Grange Road, Strood Kent.

**SHARP MZ80** built-in screen cassette recorder Basic tapes manual Forth tapes and programming books plus £250 software for sale £350 Tel. 01-455 6841 after 4 pm.

**COLEVISION ZAXXON CARTRIDGE.** Offers to Alistair Bedford 212 [illegible] after 6 pm

**ORIC-1 48K** complete with manual P S U all leads, Forth cassette and manual assembler/disassembler and documentation plus a couple of games, £130 Tel Essex (0245) 50432

**CBM 64 SOFTWARE.** S/H private sale At least 50 per cent the list. Tel Gad on Warrington 31288 ext 231 between 12 pm and 12 30 any Monday

**VIC20** plus cassette Programmer's Aid cartridge machine code cartridge 16K plus 3K Ram cartridges joystick, books and many magazines £160 ono Tel 0634 813188

**FULLER SPEECH SYNTHESISER.** Excellent condition £30 Selling because buying a microdrive Tel Wolverhampton 737179 after 4 30 pm

**ORIC 8K** Rampack mint condition boxed Swap for software or sell £15 Tel 041 729 5184 evenings/weekends

**NEWBRAIN COMPUTER** AD model built-in display manual printer leads games cassette and beginners guide Virtually unused £160 ono. Tel 021 520 2617

**8271 DISC** controller chip wanted for BBC £15 paid Tel Peter on Upminster 24385

**PHILIPS G7000 COMPUTER**, as new with six games including computer pack £65 ono Tel Tottenham 201 5680

**SWAP PORTASS** 3½in centre lathe! C/W motor single phase 3-jaw 4-jaw chucks for Dragon after disc drive Gray 179 Grange Road Letchworth Herts

**SLEVERTHALLS** program 9809 will buy or swap for Dragon software Tel Richmond 811611

**SWAP VIC** Super Expander cartridge for two games cartridges must be (Moneyware, Cosmic, Jailbreak, Menangerie) Tel Stevenage (0438) 811634 after 7 pm

**SPECTRUM 16K/48K.** Tel Langford (0888) 020130

**EXCHANGE OR BUY** ZX81 software Send list 45 Grassdale View Sheffield S12 4LZ.

**BBC SOFTWARE**, 50 programs, a range to choose from Ring for details Tel 574 2578

**BBC SOFTWARE** Acorn Soft originals and many others £5 tapes all £4 each must sell Tel 051-420 3482

**BBC MODEL A** (32K) plus printer port plus joysticks £350 ono Epson MX80 FT III hi-res printer £350 ono (less 10 per cent for both) Tel Halifax 41048

**BBC MODEL B.** Still boxed large amount of software plus joysticks and magazines etc £700 ono Tel 01-675 0640 after 8 pm

**BBC MODEL B** 1 2 O/S guaranteed. Bought September 1983 software available £360 Tel (0753) 73088

## ELABORATE




*Gateway To The Skies* is an elaborate text adventure for the BBC with 32K. It is so vast it will not fit into the machine and so has to be loaded in two parts.

The program has single key entry of all movement commands, but adopts the standard Verb/Noun format for all other instructions.

The basic point of the adventure is to search for hidden golden artefacts and take them to the palace of King Zalex. You can save the game at any stage and you'll probably need to — it sounds like a long one. A Spectrum version is also available.

**Program** *Gateway To The Skies*
**Price** *£8.00 (Spectrum £6.95)*
**Micro** *BBC (32K)/Spectrum 48K*
**Supplier** *Solar Soft, 5 Westmorland Drive, Camberley, Surrey GU15 1EW*

## CORRUPT

Richard Shepherd Software has been one of the most successful games houses specialising in adventures for the Spectrum.

The company has now released its first program for the Commodore 64. The game *Ship of the Line* is an adaptation of the program of the same name on the Spectrum.

You assume the role of an unashamedly corrupt sea captain in charge of a Royal Navy warship in the 17th century. You must fight ferocious sea battles to win treasure with which to bribe your way to the top.

Succeeding in the game is a matter of careful planning and luck: will you have enough rations to feed your mutinous crew? Will your ammunition run out?

**Program** *Ship of the Line*
**Price** *£6.50*
**Micro** *Commodore 64*
**Supplier** *Richard Shepherd Software, Elm House, 23-25 Elmshott Lane, Cippenham, Slough, Berks*

## MAGIC

Compilers are wonderful things. The biggest problem with Basic is that it is simply too slow to produce the kind of exciting games that you want to play repeatedly.

Machine code on the other hand is fiendishly difficult (well I think so anyway). A compiler though, magically turns a Basic program into machine code while you sit back and watch.

The first compiler I've seen for the BBC B has just been issued by Park Software. If it all sounds a bit too good to be true, well, as with all compilers, there are limitations.

The maximum program length is 8K and only 300 program lines are allowed. Similarly you are limited to 26 variables and 30 procedures. Nevertheless with care most things are possible and you could find the compiler very useful.

**Program** *Compiler*
**Price** *£14.95*
**Micro** *BBC B (1.2 OS, A with 32K)*
**Supplier** *Park Software, 26 Romilly Park Road, Barry, South Glamorgan CF6 8RQ*

## 3D SCRAMBLE

*Zaxxan* is the first version I've seen on the Spectrum of the impressive *Zaxxon* arcade game.

Although plot wise the format is similar to *Scramble* — break through the enemies defences to reach and destroy some ultimate objective — the game achieved its reputation because of the 3D presentation of the attack.

Your aircraft, complete with shadow, is seen from above and to the side. The enemy defences are seen from a similar perspective. The way the screen scrolls diagonally adds to the sense of pace and drama in the game.

**Program** *Zaxxan*
**Price** *£5.50*
**Micro** *Spectrum 48K*
**Supplier** *Starzone Software, 74 Wallingford Road, Shillingford, Oxford OX9 8HB*

## FUZZY

Let me be honest. I have always thought that Dragon software was appalling — everything I saw was overpriced and dull and incidently usually written in Basic.

However things are looking up. After the excellent *Ugh* by Softek, we have *Pub Crawl* by B&H Software and it's another superb Dragon game.

The screen displays a layout of various pubs and a hamburger joint. You leave home trying to visit as many pubs as you can, downing a swift pint in each. Naturally after a while things start to get a little fuzzy and with all that traffic about you'd best grab a burger to line your stomach.

Later stages of the game bring on police cars that dash about like something from the Sweeney — can you drink all the pints and make it back home?

The game is entirely in machine code and it shows: the action is very fast and the sound effects are amusing.

**Program** *Pub Crawl*
**Price** *£6.95*
**Micro** *Dragon 32*
**Supplier** *B&H Software, 208 King Street, Cottingham, Hull*

## MS RIGHT?

Lonely? Spent too much time sitting alone in front of your tv? Looking for Miss Right (or Mr Right) — now there's no need to switch off the tv and rush madly into dozens of meaningless relationships, use your computer to plan ahead.

*Matchmaker* is the program you need, roughly equivalent to the systems used by professional companies. It will store 100 people's replies to a series of 25 questions and, according to their answers, match them.

Using the computer's rating system you will be able to find the person who most likes what you like, etc. But what will you have to talk about?

**Program** *Matchmaker*
**Price** *£9.99*
**Micro** *Commodore 64*
**Supplier** *Commodore, 675 Ajax Avenue, Slough Trading Estate, Slough, Berks SL1 4BG*

## SKILLS

*Games, Graphics and Sounds* is a book intended to be both a general guide to what kinds of game are available and specific information on how some of the effects are programmed.

Along with the types of game, the skills required for each are discussed and there are various colour illustrations.

Also included is a guide to what to buy for games playing and a number of programs to type in. Given the colour illustrations it looks reasonable value at £4.95.

**Book** *Games Graphics and Sounds*
**Price** *£4.95*
**Micro** *General*
**Supplier** *Francis Lincoln, Apollo Works, 5 Charlton King's Road, London NW5 2SB*

## DANGEROUS



Terminal Software whose *Pinball* achieved wonders in 3K on the Vic has entered the competitive world of Spectrum programs

Both of its new releases are graphics adventures — *Vampire Village* and *Space Island*

*Space Island* gives you an android to control — the only equipment you have been able to get down to the planet Zyro from your spaceship orbiting the planet. You must use your android to locate the origin of a dangerous time distortion on the planet

Movement and instructions to the android are all by single key presses although there are many more options than usual. The only graphics I managed to see of the game before my android drowned was the map of the planet and this was well done. The packaging too is very robust and appealing. Recommended

**Program** *Space Island*
**Price** *£6 95*
**Micro** *Spectrum 48K*
**Supplier** *Terminal Software*
*29 Church Lane*
*Prestwich*
*Manchester M25 7LW*

## LADDERS

More praise for Dragon software. This time for *Castle Attack* a multi screen arcade game with many features

The first section is a bit like *Apple Panic* although very well done — you must run up a number of ladders on the walls of a castle to reach three keys but you must get them in the right order

The problem is various barrels and arrows are hurtling across the screen — you can avoid them but your time is limited. That though is only part one

In the second section you play a variant of Mastermind with the life of a beautiful princess as the stake. The knife suspended above her draws nearer as you fumble at the logic of a four shape code. As ever everything gets more and more difficult as you go along. Fine stuff

**Program** *Castle Attack*
**Price** *£6 50*
**Micro** *Dragon 32*
**Supplier** *M & D Systems*
*39 Sheridan Road*
*Frimley*
*Surrey GU16 5DU*

## SUPERB

Phoenix Software whose double package *Death Mines of Sirius* I thought very good value for money have now released their first Vic game in the double cassette arcade/adventure series

I can say that the action part of this package called *Four Gates To Freedom* is superb. It's a sophisticated version of *Breakout* where you fire at the walls with lasers. I've seen nothing faster, noisier or more addictive outside of some of the Llamasoft games

Mastering the action game (a seemingly impossible task) will give you the start up code to the adventure

The task then is to release the crew of a star cruiser who are held in suspended animation somewhere in the mysterious catacombs of Xzinos. It has all the standard adventure features and the package is highly recommended

**Program** *Four Gates To Freedom*
**Price** *£9 95*
**Micro** *Vic20 (+8K)*
**Supplier** *Phoenix Software*
*Spangles House*
*116 Marsh Road*
*Pinner*
*Middlesex*

## OPPRESSED

Red Shift has made the world of war-game orientated computer programs its own

The latest addition to the range is *Nebula* for the 48K Spectrum. It has the classic scenario of expansionist emperors forcing oppressed peoples to battle it out for territory and glory

I must admit that in the past I have expressed doubt with the manuals that accompany these sort of epic games — mainly because I can't understand them. On this occasion though, I can happily report that the manual is (a) quite short and (b) fairly easy to understand so it may be that *Nebula* could be an introduction to the subject

**Program** *Nebula*
**Price** *£9 95*
**Micro** *Spectrum 48K*
**Supplier** *Red Shift*
*12c Manor Road*
*London N16 5SA*

## MYSTERY

The one place where the Spectrum (16K) has no advantage over the ZX81 16K is in running text adventures. In fact the ZX81 has more available memory

So it's good to see that adventures are still being issued for the machine — the most recent is *Don't Look Now*

You explore a series of caves meeting peculiar strangers who will probably want to kill you and finding objects whose function is quite likely to remain a mystery

There is no ultimate end to the game and you must simply use your ingenuity to get as far as you can

**Program** *Don't Look Now*
**Price** *£4 95*
**Micro** *ZX81 (16K)*
**Supplier** *MDD Wheehouse*
*7 Dornic Close*
*Stewarton*
*Kilmarnock*
*Ayrshire KA3 3HE*

## WELCOME

The Commodore 64 is a very powerful machine, but important utilities like machine code programming tools are still relatively scarce

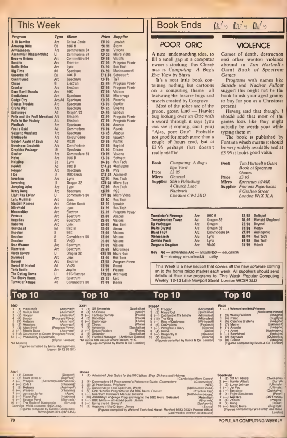
At the moment there isn't much choice for the 64 owner wanting to venture into assembly language, assembler and disassembler programs are few and far between

For this reason the *Commodore 64 Mastercode Assembler* should be welcome news, combining as it does a machine code monitor, disassembler, file editor and assembler in one package

There's no point in trying to list all the features in a short piece like this but I can say that the manual is clearly written and the program is very user friendly. I'd better add that it's by Sunshine (which is us) and was written by book authors David Lawrence and Mark England

**Program** *Commodore 64 Mastercode Assembler*
**Price** *£14 95*
**Micro** *Commodore 64*
**Supplier** *Sunshine Books*
*12-13 Little Newport St*
*London WC2R 3LD*

New Releases is designed to let people know what software is coming on to the market. If you have a new game or utility which you are about to release send a copy and accompanying details to New Releases, Popular Computing Weekly, 12-13 Little Newport Street, London WC2R 3LD



## This Week

| Program | Type | Micro | Price | Supplier |
|---|---|---|---|---|
| A 10 Bomber | Arc | Colour Genie | £8 00 | Ipswich |
| Amazing Olis | Ed | BBC B | £8 95 | Storm |
| Armageddon | Arc | Commodore 64 | £8 00 | Visions |
| Assembler Disassembler | U | Commodore 64 | £9 50 | Micro Video |
| Bauaw Brama | Arc | Commodore 64 | £8 00 | Visions |
| Bandits | Arc | Electron | £7 00 | Program Power |
| Battle Brise | Arc | Lynx | £4 50 | Bus Tech |
| Big Time | Ad | Spectrum | £4 50 | Mushmanment |
| Cassette 10 | Ed | BBC B | £11 95 | Schsoft |
| Cosmimunch | Arc | Spectrum | £8 95 | TNT |
| Chess | S | Electron | £7 95 | Program Power |
| Crooker | Arc | Electron | £7 00 | Program Power |
| Dare Devil Dennis | Arc | BBC | £7 00 | Visions |
| Deathchase | Arc | Spectrum | £8 95 | Micromega |
| Dodge City | Arc/Ad | Spectrum | £9 95 | Phoenix |
| Double Trouble | Arc | Spectrum | £8 95 | Starlite |
| Drone War | Arc | Spectrum | £4 95 | Enigma |
| Espionage | Ad | Dragon 32 | £4 95 | Exodus |
| Felix and the Fruit Monsters | Arc | Electron | £7 95 | Program Power |
| Felix in the Factory | Arc | Electron | £7 95 | Program Power |
| Pirafish | Arc | Spectrum | £8 95 | Abacus |
| Fool s Gold | Ad | Commodore | £8 95 | Romik |
| Galactic Warriors | Arc | Spectrum | £8 95 | Abacus |
| Geniepede | Arc | Colour Genie | £8 00 | Ipswich |
| Golden Apple of Zeus | Ad | Vic20 | £8 95 | Romik |
| Goodness Gracious | Arc | Commodore | £8 95 | Beyond |
| Graphics Package | Ut | Spectrum | £4 00 | Dream |
| Grabber | Arc | Commodore 64 | £9 95 | Visions |
| Heist | Arc | BBC B | £8 95 | Softspot |
| Helpline | Ed | Lynx | £4 95 | Bus Tech |
| Hobbit | Ad | BBC B | £14 95 | Melbourne |
| Hopper | Arc | Spectrum | £5 95 | PSS |
| I Do | U | BBC/Electr | £12 95 | Acornsoft |
| Invaders | Arc | Lynx | £7 95 | Bus Tech |
| Invoicing | U | Dragon 32 | £24 95 | Micro Bus |
| Jumping John | Arc | Lynx | £7 00 | Bus Tech |
| Krazy Kong | Arc | Spectrum | £6 00 | PSS |
| Light Pen Editor | U | Commodore 64 | £10 95 | Micro Video |
| Lynx Muncher | Arc | Lynx | £4 50 | Bus Tech |
| Martian Rescue | Arc | Colour Genie | £8 00 | Ipswich |
| Minefield | Arc | Lynx | £4 95 | Bus Tech |
| Moonraider | Arc | Electron | £7 00 | Program Power |
| Proteus | Arc | Spectrum | £8 00 | Abacus |
| Orgallas | Arc | Spectrum | £6 00 | Visions |
| Roborow | Arc | Lynx | £8 00 | Bus Tech |
| Switchpad | Ed | BBC B | £8 00 | Storm |
| Snooker | S | BBC | £8 00 | Visions |
| Snooker | S | Commodore 64 | £8 00 | Visions |
| Snooker | S | Vic20 | £8 00 | Visions |
| Star Warner | Arc | Spectrum | £6 00 | Visions |
| Starclash | Arc | Spectrum | £6 00 | Micromega |
| Stock Control | U | Dragon 32 | £49 95 | Micro Bus |
| Surround | Arc | Lynx | £4 00 | Bus Tech |
| Swoop | Arc | Electron | £7 95 | Program Power |
| Sword Of Hrakel | Ad | Vic20 | £6 95 | Romik |
| Tank Battle | Arc | Jupiter | £4 95 | Plasma |
| The Dating Game | U | BBC/Electron | £12 95 | Acornsoft |
| The Shaky Game | Arc | Spectrum | £5 00 | Epic |
| Tombs of Xeinps | Ad | Commodore 64 | £6 00 | Romik |
| Translator's Revenge | Arc | BBC B | £8 95 | Softspot |
| Transylvanian Tower | Ad | Dragon 32 | £6 00 | Richard Shepherd |
| Up Periscope | Arc | Dragon | £6 95 | Beyond |
| White Crystal | Arc | Dragon 32 | £5 95 | Romik |
| Word Fault | Arc | Commodore 64 | £7 00 | Audiogenic |
| Wormsearch | Arc | Lynx | £6 00 | Bus Tech |
| Zombie Panic | Arc | Lynx | £4 95 | Bus Tech |
| Zorgon s Kingdom | Arc | Vic20 | £6 95 | Romik |

**Key** Ad — adventure/Arc — arcade/Ed — education/ S — strategy simulation/Ut — utility

This Week is a new section that covers all the new software coming on to the home micro market each week All suppliers should send details of their new programs to This Week Popular Computing Weekly 12-13 Little Newport Street London WC2R 3LD

## Book Ends

### POOR ORIC

A nice undemanding idea, to fill a small gap in a computer owner s stocking this Christmas is *Computing A Bug s Eye View* by Shiva

It's a neat little book containing nothing but cartoons on a computing theme all featuring the bizarre bugs and insects created by Cosgrove

Most of the jokes are of the groan, groan kind — Hamlet bug looking over an Oric with a sword through it says (you can see it coming, can t you) "Alas, poor Oric" Probably not good for much more than a couple of hours read, but at £2 95 perhaps that doesn t really matter

**Book** *Computing A Bug s Eye View*
**Price** *£2 95*
**Micro** *General*
**Supplier** *Shiva Publishing 4 Church Lane Nantwich Cheshire CW5 5RQ*

### VIOLENCE

Games of death, destruction and other wanton violence abound in *Tim Hartnell s Giant Book of Spectrum Games*

Programs with names like *Suicide* and *Nuclear Fallout* suggest this might not be the book to ask your aged granny to buy for you as a Christmas present

Having said that though, I should add that most of the games look like they might actually be worth your while typing them in

The book is published by Fontana which means it should be very widely available and at £3 95 it looks good value

**Book** *Tim Hartnell s Giant Book of Spectrum Games*
**Price** *£3 95*
**Micro** *Spectrum 16/48K*
**Supplier** *Fontana Paperbacks 8 Grafton Street London W1X 3LA*

## Top 10

**BBC***

1 (1) Planetoids (Acornsoft)
2 (3) Rocket Raid (Acornsoft)
3 (2) Hopper (Acornsoft)
4 (4) Swoop (Program Power)
5 (7) Meteors (Acornsoft)
6 (6) Monsters (Acornsoft)
7 (9) Alien Swirl (Program Power)
8 (—) Missile Base (Acornsoft)
9 (10) Countdown to Doom (Program Power)
10 (—) Pheasibility Experiment (Digital Fantasia)

*All Micro B
(Figures compiled by Micro Management, Ipswich 0473 59181)

**ZX81**

1 (1) QS Scramble (Quicksilva)
2 (4) 1K Chess (Artic)†
3 (—) Fantasy Games (Psion)
4 (5) Sabotage (Psion)
5 (—) Espionage (Phere)
6 (8) Chess (Phere)
7 (7) Asteroids (Quicksilva)
8 (—) Space Raiders (Psion)
9 (2) Defender (Quicksilva)
10 (6) Football Manager (Addictive Games)

*All run in 16K except where shown, †1K.
(Figures compiled by Boots & Co London)

**Dragon**

1 (1) Frogger (Microdeal)
2 (3) Mined Out (Quicksilva)
3 (—) Cuthbert in the Jungle (Microdeal)
4 (10) The King (Microdeal)
5 (—) Ring of Darkness (Wintersoft)
6 (6) Champions (Peaksoft)
7 (—) Pettigrew s Diary (Shards)
8 (4) Drone (Cable)
9 (—) Dragonfly II (Hewson)
10 (7) Empire (Shards)

(Figures compiled by Boots & Co London)

**Vic20**

1 (—) Wizard and the Princess (Melbourne House)
2 (3) Wacky Waiters (Imagine)
3 (4) Pslac (Bug Byte)
4 (5) Catcha Snatcha (Imagine)
5 (7) Matrix (Llamasoft)
6 (1) Arcadia (Imagine)
7 (—) Amok (Audiogenic)
8 (—) Bewitched (Imagine)
9 (2) Skyhawk (Quicksilva)
10 (8) Frantic (Imagine)

(Figures compiled by Boots & Co London)

**Atari**

1 (1) Zaxxon (Datasoft)
2 (2) Micro 2048 er (Big Five)*
3 (—) Preppie (Adventure International)
4 (—) Zork II (Infocom)†
5 (6) Meteors (Acornsoft)
6 (—) Witness (Infocom)†
7 (—) Jumpman Junior (Epyx)*
8 (—) Planet Fall (Infocom)†
9 (—) Savage Pond (Starcade)
10 (—) The Blade of Blackpoole (Sirius)‡

Cartridge †32K cassette ‡48K disc.
(Figures compiled by Calisto Computers Birmingham 021-632 6458)

**Books**

1 (1) Advanced User Guide for the BBC Micro *Bray Dickens and Holmes* (Cambridge Micro Centre)
2 (6) Commodore 64 Programmer's Reference Guide *Commodore* (Commodore)
3 (2) 30 Hour Basic *Prigmore* (NEC)
4 (3) Supercharge Your Spectrum, *Webb* (Melbourne House)
5 (7) One Hundred Programs for the BBC Micro *Gordon* (Prentice Hall)
6 (—) Spectrum Hardware Manual *Dickens* (Melbourne House)
7 (10) Assembly Language Programming for the BBC Micro *Birnbaum* (Macmillan)
8 (—) BBC Micro — an expert guide *James* (Granada)
9 (—) Using the 64 *Gerrard* (Duckworth)
10 (9) Anatomy of the Dragon *James* (Sigma)

(Figures compiled by Watford Technical Books Watford 0923 25324 Prestel 28824)
(Last week s position in brackets)

**Spectrum**

1 (2) 3D Ant Attack (Quicksilva)
2 (—) Harrier Attack (Durrell)
3 (3) Lunar Jetman (Ultimate)
4 (—) Jet Pac (Ultimate)
5 (—) Bugaboo (Quicksilva)
6 (1) Flight Simulation (Psion)
7 (—) Meteors (DK'Tronics)
8 (4) Zzoom (Imagine)
9 (7) Kong (Ocean)
10 (—) Manic Miner (Bug Byte)

(Figures compiled by W H Smith and Sons London)



# Ziggurat

## Advertising Standards

When we just cannot get our arcade scores any higher or figure out how to get past that fierce lavatory seat with one hand tied behind our back, the cares of the world on our shoulders and that Pesky Pie-Person giving us clues all the time computer exhaustion finally takes hold

We desperately want to relax so we pull out the computer lead push the aerial back in and think of a number between one and four This helps to sooth our tatlared nerves until the commercial break arrives and a laipe grey elephant or a superannuated Scouse cynic appears to insult our intelligence In desperation we grab the *Radio* and *TV Times* to look for an alternative but once again those corny adverts leer out at us from the pages We turn off in disgust and pick up a newspaper but there s no getting away from it as everyone from the biggest hypermarket to the local greengrocer seems to be claiming that 'you can't buy it cheaper elsewhere

We are not sure of other people s reactions but the current state of computer promotion certainly has us oscillating between hysterical laughter and sheer horror We know that to the entrepreneur computers are for selling not for buying and that all advertisers are given to hyperbole but surely there must be a limit somewhere! If you regularly read *PCW* (and even Ziggurat!) you probably already have a micro of some sort (or at least have tinkered with your friend s) so you presumably have some idea about what the important features are in a home micro

On the other hand it seems that computer promotion has sunk to the depths of the car industry where the whole point seems to be to extoll the importance of trivialities and to avoid the really important issues at all costs So who are they fooling?

Regrettably the answer is usually the first time buyer who thinks Ram is a male goat and that Rom wasn t built in a day

As Christmas approaches and the stampede intensifies all reason seems to vanish as Mum and Dad know that little Johnny (or Jenny) will be inconsolable if Santa doesn t deliver the goods So how do they choose and where do they go?

The answer usually lies in the relative importance of the bank-balance " keeping up with the Joneses" and what name has been subliminally impressed on their mind

Although every Tom Dick and Harry now sells computers and every store seems to contain a computer shop it is regrettably true that the demand for qualified salespersons far outstrips the supply (one of the funniest sights this week was the pathetic computer sales manager of a local department store trying to pretend to a real dealer that he was a potential purchaser so that he could glean some information on the products to pass on)

Of course, Darwin might argue that natural selection will ensure the survival of the fittest but the harsh world of reality seems to select more on the basis of brute force than technical excellence What seems to count most in this market place is how much you can afford to spend on promotion rather than how good your product is (or even more important how good the back-up will be)

The last few months have seen the death-throes of a number of companies yet more have retired in haste to lick their wounds and the writing is on the wall for several more After Christmas we are certain that there will be a lot of wailing and gnashing of teeth as many of the big stores wrap up their chips get out the holiday brochures and relegate computers to the store cupboard leaving too many customers to find out for themselves that they have bought a pig in a poke ■

**Keith and Steven Brain**

# Puzzle

## Egyptian code

**Puzzle No 83**

This interesting fragment of an ancient Egyptian clay tablet was recently unearthed by that eminent archaeological duo — Drs Diggett and Trowell It is thought that it represents a multiplication sum out unless it is shown that it is possible to satisfactorily substitute digits for the symbols shown this theory cannot be proved There is evidence that the sum is in decimal notation and the bird symbol was used to represent the digit 3

Can you make the archaeological breakthrough and confirm the theory?

**Solution to Puzzle No 78**

The program uses three variables *N* the number of the highest double of successively larger domino series *P* the number of pieces in the set and *T*, the total number of spots

Subsequent orders of sets are calculated in the *For/Next* loop (Lines 40 to 70) and the program stops when the total number of spots exceeds 1983 the present date

```
10 LET N = 0 0 LET P = 0 30 LET T = 0 40 FOR A
N TO 0 STEP - 1 50 LET T = T + A + N 60 LET P
P + 1 70 NEXT A 80 PRINT N    P    T 90 IF T
1983 THEN STOP 100 LET N = N + 1 110 GOTO 40
```

The program gives the solution of a set with 120 pieces — up to a double-fourteen giving a total of 1680 spots the year required by the puzzle The previous set up to a double-thirteen can be ruled out because of the number of spots This gives the year as 1365 and it seems too close to the date of the set itself manufactured by distant ancestors in the 14th century

**Winner of Puzzle No 78**

The winner is E Oakley South Road North field Birmingham who receives £10

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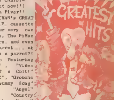
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